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INTERNATIONAL FIRE PROTECTION

THE GLOBAL VOICE FOR PASSIVE & ACTIVE FIRE PROTECTION

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Publishers
Mark Seton & David Staddon

Group Editor
Graham Collins

Editorial Contributors
Sean Appleton, Wouter Bossink, Jim Creak, Mark Froggatt, Eva Kosanovic, Mac Mottley, Brian Robinson, Charles Taylor, Mike Wood, Nick Grant

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MDM Publishing Ltd
The Abbey Manor Business Centre,
The Abbey, Preston Road,
Yeovil, Somerset BA20 2EN
Tel: +44 (0) 1935 426 428
Fax: +44 (0) 1935 426 926
Email: dave.staddon@ifpmag.com
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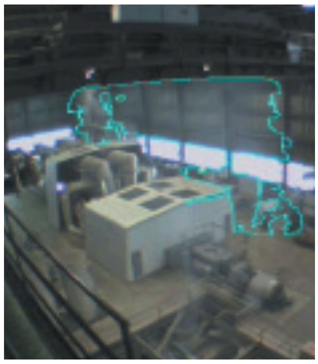
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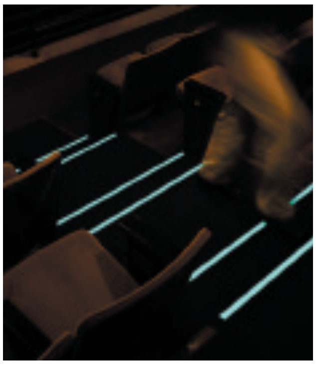
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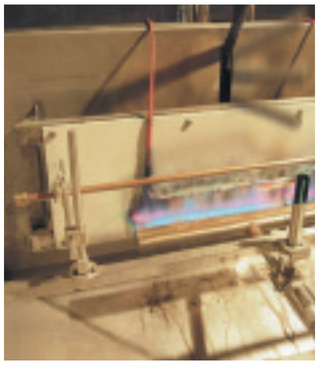
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Graham Collins

What's It All About?

The 2011 round of fire safety exhibitions and conferences will soon be underway and we will, I expect, be presented with any number of interesting new developments and enhancements to already established fire protection technology. No doubt we will be reporting in detail on many of these in the pages of International Fire Protection in the coming months.

However, what we may sometimes easily lose sight of is what precisely is all of this technology for? What is it all about? The short answer is, of course, that all of this ongoing investment and heavyweight brainpower is directed towards saving lives and protecting property.

I suspect that few would argue that saving lives is, in the vast majority of cases, the more important of these two endeavours. In fact, most of the fire safety legislation around the world has come about as a direct or indirect result of people being killed or at least seriously injured in a particular fire environment or set of high-risk circumstances. And so, today, we have sophisticated and reliable technology that alerts us, talks to us, directs us, opens escape routes for us, and lights our way to safety. Architects and fire engineers are constantly striving to improve buildings' passive fire protection, and manufacturers have come up with ever more ingenious devises to assist safe escape of both able-bodied and disabled people from high-hazard environments, the likes of high-rise buildings, aircraft and ships.

These are entirely laudable endeavours, and long may they continue. So, keeping abreast of developing technology and techniques, whether through the pages of magazines such as International Fire Protection or by visiting exhibitions and conferences, is critical to our collective ability to provide the best possible protection.

But, we also must acknowledge that safeguarding peoples' lives involves being aware of the vagaries of often bizarre human behaviour when suddenly confronted by highly stressful and frightening situations. Logical behaviour is often the first casualty of a fire.

We have all of us heard horror stories of how some individuals behave in a fire: they sit tight and do nothing in some sort of vague hope that the problem either is not real or will go away; are insistent on finishing their meal while the restaurant kitchen is transformed into a raging inferno; or dogmatically attempt to escape via their usual exit route, even though this may be leading them directly towards disaster. The list goes on and on. So in this edition of the magazine we have looked at a number of topics relating to safely egressing a building. In addition to an article over-viewing evacuation generally, this includes taking a close look at evacuation lighting and signage.

This edition of International Fire Protection also gets to grips with two specific areas of fire protection: stadia, where most occupants have little or no idea what to do in an emergency; and marine and shipboard, where evacuation would seem to be merely heading towards another life threat – the open sea. Additionally in these pages we have included articles on the latest developments in sensor and video detection technology, a review of where we stand today in relation to clean suppression agents, plus a number of articles on the all-important passive protection – fire-rated cabling, fire stopping and protecting structural steelwork. IFP

Logical behaviour is often the first casualty of a fire

Cable Powers-Up Dubai Projects

DRAKA has announced that a number of different zero halogen, low smoke OHLS cables have been installed in two recent major projects in Dubai: the 25,000-spectator Dubai Sports City Cricket Stadium and the Entrepreneur Business Village.

The cricket stadium features state-of-the-art facilities including a high-tech lighting system that will enable matches to be played in the cooler evenings, replicating natural daylight. It is lit up by a 350-plus-floodlight "ring of fire" that has been installed in the rim of the stadium's roof in such a way that it lights up the field and prevents any shadows that may distract players.

The 93,000 square metre, purpose-built Entrepreneur Business Village includes conference and meeting facilities, a child-care centre, gymnasium and health club. It is one of several initiatives from the Mohammed Bin Rashid Establishment for Young Business Leaders, and is aimed at unlocking and strengthening the business potential among entrepreneurial Emirati, Arab and resident populations, and provides a comprehensive array of services and facilities to drive business forward in the region.

The cables chosen for the projects included Draka's Firetuf FTP, which prior to a recent complete rebranding of the Draka cable offering was called Firetuf Power, and Firetuf FT Sifer that was originally known as Firetuf Sifer.

For more information, go to www.draka.com

A Boost For Offshore Safety

US-based DET-TRONICS is highlighting the fact that flame and gas hazards are not the only dangers faced by rig and platform workers; false alarms, the company says, pose dangers to workers and can be expensive in production down-time.

Depending on the detection technology installed, false alarms can be triggered by welding and reflected sunlight, for example, and rig and platform personnel can be injured as they respond to the false alarms. Conversely, if false alarms become a common occurrence, response time might well decrease with potentially dire consequences if the detector activation is in response to a real fire.

To avoid the false-alarm problem, Det-Tronics' advice is to look for a flame detector that uses multi-spectrum infrared, or MSIR, technology. The company's Model X3301 MSIR detector uses three sensors at three different wavelengths, a sophisticated 32-bit microprocessor, sophisticated software algorithms, and a calibrated optical check verifying proper operation for each sensor. It can ignore modulated infrared sources, reflected sunlight, welding, lightning, and other non-fire sources in its field of view – and yet still retain its alarm capabilities.

For more information, go to www.detronics.com

Romanian Solution Gets The Works

The Museum of Regional History in Oradea, Romania is now protected by a fire safety solution that sees a ULF Aquamist system from TYCO FIRE PROTECTION PRODUCTS teamed up with an Inergen inert gas suppression system to protect the 140-year-old, 4,850 square metre floor area building.

This particular watermist system was chosen because, the company says, its smaller diameters pipework could be more easily accommodated in the restricted space that was available, and because the system uses considerably less water than water sprinkler systems to extinguish a fire. This ensures that the valuable contents and artefacts within the museum will not suffer severe water damage as the system – the first the ULF Aquamist system to be installed anywhere in the world – is claimed to use a fifth of the water when compared with water sprinkler systems on the market.

In addition to the watermist and inert gas systems, the €260,000 engineered fire protection package included G-Press press-fit piping, nozzles, pump skid and pipe supports, design software and installation training.

For more information, go to www.tyco-fsbp.com

Fire and Gas Safety? Try Ash

An addressable smoke and heat (ASH) module – a single fire and gas safety system that monitors process areas and living quarters – has been introduced by DET-TRONICS. When combined with the Eagle Quantum Premier (EQP) safety system, it identifies the precise location of an alarming smoke or heat detector.

The company says that users no longer need to rely on an external fire panel to determine where a fire is occurring, as the ASH module enables smoke and heat detection in living quarters to be included in the same EQP system with flame and gas detection in hazardous process areas. All the information can be accessed now in one integrated EQP system that is Factory Mutual (FM) certified to the new NFPA 72-2010 standard.

Additional safety and ease-of-use features are cited as including: multiple smoke / heat detectors and devices on a single safety loop or spur; support for an array of devices, including horns, strobes, manual call stations, and input/output units; simple programming and logic; and enhanced functionality, such as integrated device level automatic integrity checking.

For more information, go to www.det-tronics.com

Testing Time For Emergency Lighting

Spur wiring capability, a touch-screen user interface and web access to historical test data are being highlighted by COOPER LIGHTING & SAFETY as features of the latest version of its Easicheck automatic test system for emergency lighting.

The enhanced system is claimed to provide continuous monitoring of lamp, battery and control-gear functionality, together with programmable test regimes that comply with prevailing regulatory requirements, offering a high-integrity solution for the automatic testing of up to 200 emergency luminaires in either a loop configuration or a loop with spurs.

An auto-learn facility automatically scans the data loop and gives each luminaire an address number corresponding to its position on the loop. If more luminaires are added at a later date, the system can be either instructed to allocate the next available address without altering any existing addresses, or to carry out a new auto-learn sequence to re-establish consecutive addressing on the loop. For large installations, up to 63 Easicheck 2 panels can be networked together enabling a maximum of 12,600 emergency luminaires to be monitored.

The system can be programmed with up to 16 independent test groups to accommodate different test regimes or test times in different parts of a building. As well as being compatible with Cooper's own emergency luminaires, Easicheck 2 can be used in conjunction with other manufacturers' products and the system is suitable for use with tungsten, fluorescent and LED luminaires.

For more information, go to www.cooper-ls.com

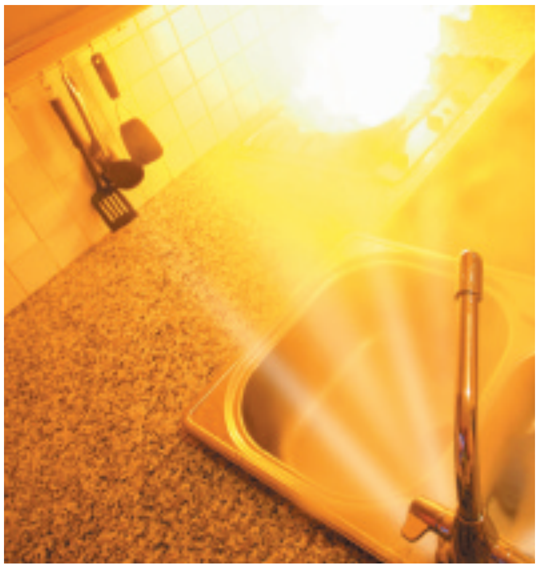
New System Targets Residential Buildings

PLUMIS has launched Automist, describing it as "an innovative fire protection system designed to integrate seamlessly into residential properties". Intended as a lower-cost alternative to sprinklers, Automist can be retrofitted without major disruption.

Triggered by a heat alarm, the device uses a high-pressure pump to provide whole-room watermist suppression in any fire-prone location or exit route. It can be installed almost invisibly in kitchens. Extensively tested by BRE (Building Research Establishment), Automist is suitable for rooms measuring up to eight metres by four metres. It can be installed in around two hours, requiring only mains water and electrical connection.

Automist was named recently as one of the top 15 inventions of the last decade in an exhibition at the British Library. It also scooped the prize for the top invention in last year's James Dyson award.

For more information, go to www.plumis.co.uk



School Bus Protection

A change in legislation requiring that all school buses operating in Dubai must now be provided with an automatic suppression system has led to a major order being placed for FIRETRACE INTERNATIONAL's Firetrace stand-alone fire detection and suppression systems. The order was placed by Indian bus, truck and engine builder, Ashok Leyland LLC, for new buses manufactured at its bus assembly plant in neighbouring Ras Al Khaimah.

More than 10,000 vehicles are now protected by Firetrace systems, and the solution provides each Dubai bus with reliable, around-the-clock, unsupervised protection that requires neither electricity nor external power. It comprises an ABC powder suppression agent cylinder that is attached to a specially developed leak-resistant polymer tubing that is routed throughout the engine compartment. This is a linear pneumatic heat and flame detector that delivers the desired temperature-sensitive detection and delivery characteristics in even the most demanding environments.

Immediately a fire is detected, the tubing ruptures and ABC powder suppression agent is automatically released, extinguishing the fire precisely where it starts and before it has had time to escalate or spread. The detection tube is routed to the engine area at the front of the vehicle. A tee is included in the installation, which takes a section of the tubing to a pressure gauge mounted on the driver's dash board, providing a clear visual indication of the system's status.

For more information, go to www.firetrace.com

Installation Safeguards Historic Collections

Staff, visitors and priceless collections at the world-famous Natural History Museum in South Kensington, London are being protected by an EXTRALIS Vesda LaserPlus aspirating smoke detection (ASD) system.

The Grade I Listed Waterhouse building is one of Britain's most striking examples of Romanesque architecture, and is home to one of the largest and most important natural history collections in the world. It houses over 70 million specimens, spanning from microscopic slides to massive skeletons, which are used for scientific research. The Museum also contains an array of educational, electronic and exhibition resources.

The aspirating smoke detection system was installed in the large roof void on the second floor as part of an upgrade to the Museum's existing fire system.

Protecting a heritage building requires careful thought regarding the aesthetic impact of the detection system, and the Vesda solution is said to have been specified for its advantages over conventional point or beam detection systems in protecting large open spaces. ASD solutions can be deployed unobtrusively to preserve aesthetic features, and maintenance and service can be carried out from a central detector point, further minimising disruption.

Open areas or voids feature stratified, thermal layers that can prevent cooled smoke from reaching ceiling level, and ASD systems provide continuous air sampling that detects even the smallest particles of smoke at the earliest stage of a fire. This very early warning buys time to investigate an alarm and stage an appropriate response to prevent injury, property damage or business disruption.

For more information, go to www.xtralis.com/naturalhistorymuseum

Association Issues Fire Seal Warning

Many polyurethane (PU) foams carry claims that they are "fire rated", often citing a Class B1 or similar performance when tested to DIN 4102, or Class D when tested against European standards. However, the ASSOCIATION FOR SPECIALIST FIRE PROTECTION (ASFP) points out that these classes refer to "reaction to fire" classifications that are concerned with the ignitibility, surface flaming and heat release characteristics of the material. "Reaction to fire" classifications do not mean that the product is acceptable where fire resistance is required, in applications such as linear gap or service penetration seals.

PU foams that are to be used in linear gap or service penetration applications must have their fire performance determined by testing to the appropriate fire resistance test. In the UK the appropriate Standard is BS 476: Parts 20/22 (BS EN 1366-4 in the case of linear gaps) and BS EN 1366-3 for service penetration seals.

The ASFP has produced an advisory note on this particular aspect of fire safety, which can be downloaded from its website.

For more information, go to www.asfp.org.uk

More Cores Added to Cable Range

Three-core and four-core $6mm^2$ cables have been added to the Afumex LSX power and lighting circuits range from PRYSMIAN, which is designed for applications where a screened, low smoke, halogen-free and reduced flame propagation cable is required.

The Afumex LSX range is BASEC (British Approvals Service for Cables) approved to BS 8436:2004, and meets all the requirements of the 17th edition Wiring Regulations for installation in thin walls and partitions. It can be used on rack, ladder or tray where traditionally a bulky armoured cable would be installed, and is claimed to offer cost-savings as it is smaller and lighter than armoured cables meaning fixings and supports can also be smaller. Other features cited for the cable include construction that offers rigidity and ease of bending that keeps its shape during installation, with no 'spring back', while easy stripping reduces the first and second-fix termination times when compared with steel wire armoured cable.

For more information, go to www.fpcables.co.uk

Sensor's Sounder is Built-In

A new analogue addressable photoelectric smoke sensor with built-in sounder has been unveiled by NITTAN (UK). Unlike other smoke sensors on the market that the company says require a separate sounder base to be installed that adds to the cost of the installation and takes longer to fit, the Evolution EV-PS optical smoke sensor comes with the sounder fully integrated within the sensor itself. Integrating the sounder in the unit is also said to make for a more aesthetically pleasing appearance, lower profile.

The EV-PS incorporates ASIC design, EEPROM addressable capability, low monitoring current and a chemically-etched stainless steel insect screen to reduce ingress of insects and airborne contaminants. It also features Nittan's Omniview 360 degree LED fire alarm indicator, permitting clear and visible indication of the sensor's operation from any angle, and a remote indicator output.

For more information, go to www.nittan.co.uk

Ductwork Saves the Day at Hotel

Fire-resistant ductwork is being hailed as the saviour of a five-star rated hotel in the UK following a fire inside the hotel's kitchen ductwork that was completely contained and spread no further. The fire caused very little damage and the hotel was soon operating normally after the event.

The Flamebar BW11 ductwork, manufactured by FIRE PROTECTION LTD, is constructed from galvanised sheet steel that is sprayed with a specially-formulated water-based fire protective compound. This coating compound contains selected mineral filters in a low permeability elastomeric binder and is applied at a thickness of approximately one millimetre. It provides in excess of two hours insulation when contending with internal gas temperatures of 400°C, and the composite nature of the system allows a reduction in base duct construction thickness or gauge and a reduction in duct reinforcement.

The system has been successfully tested under cellulosic fire conditions for international use, to give in excess of four hours fire resistance, and can be used for smoke extract, car park extract, kitchen extract, and stair pressurisation systems.

For more information, go to www.fireprotection.co.uk

Upcoming Events

Protex Arabia

13th to 16th March 2011

Jeddah Centre for Forums & Events, Jeddah, Saudi Arabia

Protex Arabia 2011 is the first international fire, safety and protection trade exhibition to be held in the Kingdom of Saudi Arabia **www.protex-arabia.com**

MIPS

26th to 29th April 2011

Moscow Expocentre Fairgrounds, Moscow, Russia

The 16th International Protection, Security and Fire Safety exhibition **www.mips-expo.com**

International Firex 2011

6th to 19th May 2011

NEC , Birmingham UK

The UK's largest dedicated fire safety event, hosted in partnership with the Fire Industry Association.

www.info4fire.com/internationalfirex

EuroFire 2011

EuroFire 2011
5th European Conference
Fire Safety Engineering: Trends and Practical Applications

25th to 27th May 2011

Ecole Militaire, Paris, France

The 5th European conference on fire safety engineering trends and practical applications

www.eurofireconference.com

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Head of Fire Protection (Glass & Glazing Design), Pilkington UK

One of the most important recent developments in the world of fire safety design has been the increasing trend towards risk-based methods. This is primarily in response to the complexities and sizes of modern public buildings, within the wider context of a consistent approach to health and safety. There has also been a growing realization that furnace testing as a way to basic classification of fire-resistant products, without providing the background detail of product performance characteristics, does not on its own allow a sufficiently robust risk assessment of what is likely to happen in real fire situations.

The move away from prescriptive rules rooted in history is illustrated, for example, in the UK by the principles followed by the new standard BS 9999: 2008 (Code of practice for fire safety in the design, management and use of buildings) and the reminders of personal responsibility and competency captured in the Regulatory Reform (Fire Safety) Order 2005 (FSO). Under the FSO, responsibility for ensuring that appropriate fire precautions and protection measures are in place rests with the individuals who carry responsibility for the building and its occupants. Contractors carrying out refurbishment and replacement work in the building should also comply.

A risk-based approach requires more information than has become customary with rule-based prescription. Risk judgments require confidence in product performance, plus assurance concerning reliability and consistency of product function. That requires more attention to the range and validity of furnace test data, including the extent of application. One or only a few formalised standard furnace tests are not enough. Evaluation of risks in building fires requires a broader evaluation. A "Test, test and test again" philosophy is key, to develop as extensive a scope of test evidence as possible, in all sorts of glazing systems and applications. That should be combined with real fire experience, large scale fire tests and a focus on the robustness of the underlying technology (including identification of any limits that may apply.)

Modern challenges are not limited to the complexities of new buildings. Old buildings have particular challenges in their own right. Refurbishments are one of the most effective ways to breathe life into an old building, offering an opportunity to maintain the look of a building and its essential character whilst making it safer, in line with modern fire safety practice, and more pleasant for occupants. Two recent refurbishments where Pilkington **Pyrostop®** was specified to meet the requirements are North Glasgow College and Bedford Magistrates Court. Both are areas of high foot flow where visitor safety is of paramount importance.

North Glasgow College has utilised Pilkington **Pyrostop®** fire-resistant glazing as part of a refurbishment and for a state-of-the-art learning facility in its Springburn campus. This £42 million, 16,900m^2 development incorporates a central atrium space, with Pilkington **Pyrostop®** used to protect its occupants and contents from fire whilst allowing natural light into the building.

Two separate elements of the college, academic teaching spaces and technical workshops, have been joined with a glazed corridor, whilst the atrium provides a new social hub, café area and a junction where circulation routes cross. Safety is paramount, and a tried and tested product with protection against heat, flames and hot gases was required. Pilkington **Pyrostop®** also provides protected firefighter access after the occupants have left and further protects the building against extended fire exposure to limit fire spread and damage.

Bedford Magistrates Court is a red brick and terracotta Gothic style building that still sees many visitors through its doors each week. Pilkington **Pyrostop®** was specified in a £1.25million refurbishment of the Grade 2 listed Magistrates' Court in Bedford. The historic building, constructed in the 1800's, now has the fire-resistant glazing in doors, screens and windows, offering both integrity and insulation fire protection to modern standards and expectations of fitness for purpose. The changes maintain the core character of the building whilst enhancing its essential fire safety requirements. IFP

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Pilkington Pyroshield® 2 Safety Clear A robust integrity glass with the traditional recognised strengths in fire of wired glass. Capable of attaining the European radiation criteria for 15 minutes (EW15)

The intumsecent Pyrostop and Pyrodur range in particular offers good acoustic insulation performance and can be combined with other glass types to give a range of functional performances. Impact safety classifications apply as appropriate.

For further information, go to
www.pilkington.co.uk
www.pilkington.co.uk/specifire

Pilkington **Pyrostop**® and Pilkington **Pyrodur**®

In the event of fire, Pilkington **Pyrostop**® can provide insulation against heat for up to 120 minutes, with Pilkington **Pyrodur**® also able to provide full insulation for a short period of time – protecting the property and giving people more than enough time to vacate the building safely. As well as acting as a barrier against hot gases and flames to increase protection, they reduce any panic by turning opaque. Available in a range of thicknesses to suit every need, Pilkington **Pyrostop**® and Pilkington **Pyrodur**® can definitely stand the heat. For more information visit www.pilkington.co.uk/fireresistant, email pilkington@respond.uk.com, call 01744 692000 *quoting 18842* or contact one of our stockists.

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Manual Waterproof Call Points

The waterproof call point (WCP) from KAC, a world leader in manual call point technology, is designed specifically for installation in extreme conditions.

In outdoor or harsh environments, the WCP is ideal where large volumes of dust, dirt or moisture are likely to be present. Sealed to IP67, its environmental protection rating far exceeds the requirement of IPx3 specified in EN54-11, as an IPx3-rated device is highly unlikely to provide long-term reliability if installed in an outdoor or harsh environment.

For hazardous areas, the intrinsically safe (IS) version of the WCP is designed for potentially-explosive closed or open environments, such as fixed offshore platforms, petrochemical plants, flour mills and grain silos. It is approved for use in Zones 0, 1 and 2 gas atmospheres and Zones 20, 21 and 22 combustible dust environments. Zones 0 and 20 define environments where potentially-explosive gas or dust will always be present in the atmosphere. In Zones 1 and 21, an occasional presence of combustible gas or dust may be expected during normal operations, and in Zones 2 and 22, the presence of combustible gas or dust is unlikely, but may occur for very short periods.

The WCP from KAC is EN54-11 approved, both as a traditional break-glass and as a resettable element unit. It can be changed from one type to the other by changing a single component – the operating element. This simple and low cost procedure, which can be easily carried out in the field if required, enables the call point to be configured in the optimal manner for the installation. No additional parts, springs or other changes are necessary.

With the addition of IP67 protection and hazardous area capability, the WCP range offers all the benefits of the modular manual call point indoor range upon which it is based. It has the same terminal block into which the field wiring is connected at first fix, with the WCP itself being connected into the terminal block at commissioning. As the field wiring is fixed, excess cabling to enable the WCP to be removed does not have to be crammed into the back box, minimising any chance of damage. After connection to the system wiring, the terminal block may be initially fitted with a simple continuity link, enabling the wiring to be tested for open, short circuit and earth fault without the WCP product itself being in place.

When commissioning, the terminal block is simply plugged into the WCP, which in turn is then snapped into the back box that has plenty of room for cabling. Three standard 20mm cable entries are fitted to the back box, allowing in-out or pass-through surface wiring to be installed easily from either above or below the unit. The WCP front snap-fits to its back box in seconds to create an IP67-rated assembly, reducing installation time.

Once installed, the WCP cannot be tampered with. If the lid of a device is removed without isolation from the panel, the alarm will sound. Test, reset and lid release functions are actuated by a single tool. IFP

For further information, go to www.kac.co.uk

International Firex returns

International Firex – the UK's largest dedicated fire safety event – returns to the NEC Birmingham from the 16th to the 19th May 2011. This biennial event will be a chance for fire safety specialists, including installers, specifiers, consultants and those responsible for fire safety in their work premises, to discover the very latest innovative fire safety solutions.

More than 150 companies will be showcasing their products and services. Confirmed exhibitors include Advanced Electronics, C-Tec, Kentec, Apollo Fire Solutions, EMS Radio Fire & Security, Hochiki Europe (UK), Cooper Fulleon, Fireco, Kidde Products Limited, Nittan, Detector Testers, Detectomat, STI Europe, Fike Safety Technologies, Fike Protection Systems, Tyco Fire Suppression Systems & Building Products. Industry bodies, including the Association of Specialist Fire Protection, Fire Industry Association, BSI Global and the LPCB (BRE Global), are also among those exhibiting.

A full free-to-attend seminar programme will be running alongside the exhibition, with presentations based on the latest product innovations, best practice, standards, approvals and compliance, and current fire safety legislation. The exhibition will also incorporate four unique feature areas: The ASFP Passive Fire Protection Zone; LPCB Red Book Pavilion; Info4fire.com Learning Zone and Fike Village.

ASFP Passive Fire Protection Zone

This new feature, a combined hospitality and free seminar area hosted by the Association of Specialist Fire Protection (ASFP), will focus on products, services and best practice in built-in fire protection. With a strong emphasis on professional expertise and the requirements for approved installers and contractors, the Passive Protection Zone will provide visitors with exclusive access to industry experts and knowledge.

LPCB Red Book Pavilion

Following on from the successful launch of the LPCB Red Book Pavilion in 2009, this key feature provides visitors with vital information on third-party approval schemes and product testing currently undertaken by the BRE Global/LPCB. A

to the NEC, 16th–19th May

free seminar programme and exhibitor village will be available to provide advice and guidance on the importance of third-party approval.

Info4fire.com Learning Zone
The Info4fire.com Learning Zone will be run in association with the Fire Industry Association – the UK's leading trade organisation for the fire safety sector. There will be a range of free seminars and presentations on fire risk assessment, fire alarm system design, emergency lighting, business advice, portable extinguisher maintenance and fire safety legislation.

Fike Village
The Fike Village is a new feature developed to provide a relaxed and informal 'village' for Fike Protection Systems and Fike Safety Technology customers to meet and entertain key specifiers and end users attending the show. Working with a number of key distributors, the latest Fike suppression and alarm fire safety products are essential aspects of the Fike Village where the emphasis will be on innovation and technical expertise.

Fire Excellence Awards 2011
Held every two years and coinciding with the International Firex exhibition, the Fire Excellence Awards 2011 celebrate the best products, services and individuals in the fire safety industry. The awards offer the chance to gain unrivalled industry recognition as an award winner or finalist. The Fire Excellence Awards take place at the Hilton Birmingham Metropole on Tuesday 17 May 2011. IFP

For further information, go to www.info4fire.com/internationalfirex

Alarmeye® Detection

AlarmEye® from Shield, the first UL listed video image smoke and flame detection system (VISFD), is designed for large open spaces such as: warehouses; aircraft hangars; exhibition centres; stadiums; tunnels; and industrial plants. It has the capability to detect flame and smoke in real-time video and operate continuously under any lighting conditions.

AlarmEye® addresses most of the problems commonly faced by video image detectors by having strong immunity to interference, such as natural sunlight, reflective or flashing lights, arc welding and steam. Additionally, it is able to detect obstructed fire, smoke in total darkness, and transparent-flame alcohol fire. Because it is designed as a distributed system, it can be installed as an independent detector, or as part of a network as it is compatible with most systems on the market.

In structures with large open areas, traditional fire detection methods, such as point and beam detectors, have shown to be ineffective at detecting fires sufficiently quickly, due to high ceilings and spatial restrictions. In these applications, even the most sensitive air sample detection method is not the best solution due to factors that include air-conditioning, heating and ventilation, height and open space constraints. Furthermore, smoke from fires usually flows in a sideways manner, stratifying, and dispersing, delaying the response time of traditional detectors.

Key features

Early Detection

AlarmEye® is capable of detecting the initial stage of a burning fire and its smoke signature, at its source and regardless of its movement pattern.

Detection of flame and smoke in factory

Immunity to False Alarms

It is not plagued by the disadvantages of video image detection's inability to differentiate between what may appear to be flame and smoke, such as natural sunlight, reflective or flashing lights, arc welding and steam to actual flame and smoke.

For further information, go to www.shieldglobal.com

Light and Dark Environment

AlarmEye's detection technology allows the system to detect smoke, even in total darkness. As the environmental light decreases to a certain degree, the IR light source will automatically switch on allowing AlarmEye® to detect smoke under dim or no light environments.

Detection Capability for Obstructed Fire

Another disadvantage of video image detection systems is obstruction. Under normal circumstances, if the fire is obstructed from the view of the detector, it will not be detected. This will cause problems in areas where objects such as storage shelves, machines and equipment will obstruct the view of the detector causing an alarm not to be raised when there is, in fact, a fire. AlarmEye® is capable of detecting reflections of the obstructed fire on its surrounding objects and hence is still able to alarm even if the fire cannot be "seen" in the video image.

Distributed Intelligent System Architecture

Most traditional video image detection systems are structured as cameras linking to an external server for image processing and alarm signal output. AlarmEye®, on the other hand, is designed as a distributed intelligent system; its processing is done in the detector itself, hence there is no limit to the number of detectors that can be installed in a network.

Intelligent Security Surveillance

Not only can the AlarmEye® system detect flame and smoke, it has intelligent security surveillance functions that allow for trip-wire, invader, loitering, theft, counting, and abandoned object detection. IFP

Introducing EN12845 FIRE PUMP LINE

Patterson Pump Ireland Ltd. specialises in the production of world class fire protection equipment around Europe.

From enquiry stage, right through design, manufacturing, installation and after sales service, Patterson Pump Ireland strives to provide a quality, reliable fire protection system, at the most competitive price.

EN12845 provides a pan-European standard for the design, installation and maintenance of automatic sprinkler systems, and encompasses the basic requirements set forth by local rules into one European Standard.

The new Patterson Pump End Suction product line is the latest addition to the Patterson Sentinel™ range. Cost effective and efficient, these will be used in fire pump packages specifically designed and built to comply with the regulations of European standard EN12845, along with other local rules.

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Stadia Fire Safety – Where Failure Is Not An Option

Wouter Bossink

Tyco Fire Protection Products

Stadia have changed dramatically in recent years, with more than 50 stadia in the world now capable of holding more than 80,000 people.

As centres for entertainment, housing much more than just sporting events, stadia now host conferences, music events and corporate hospitality. With this in mind, newly constructed stadia need to be comfortable and provide areas to shop, eat and relax, and accommodate large audiences and provide comfort for corporate partners and VIPs. This can be a major challenge for civil engineers and facilities managers, who need to keep visitors happy, and more importantly, safe. Fire and safety systems need to be easy to install and maintain, as well as large enough to cope with such a sizable venue – failure is not an option.

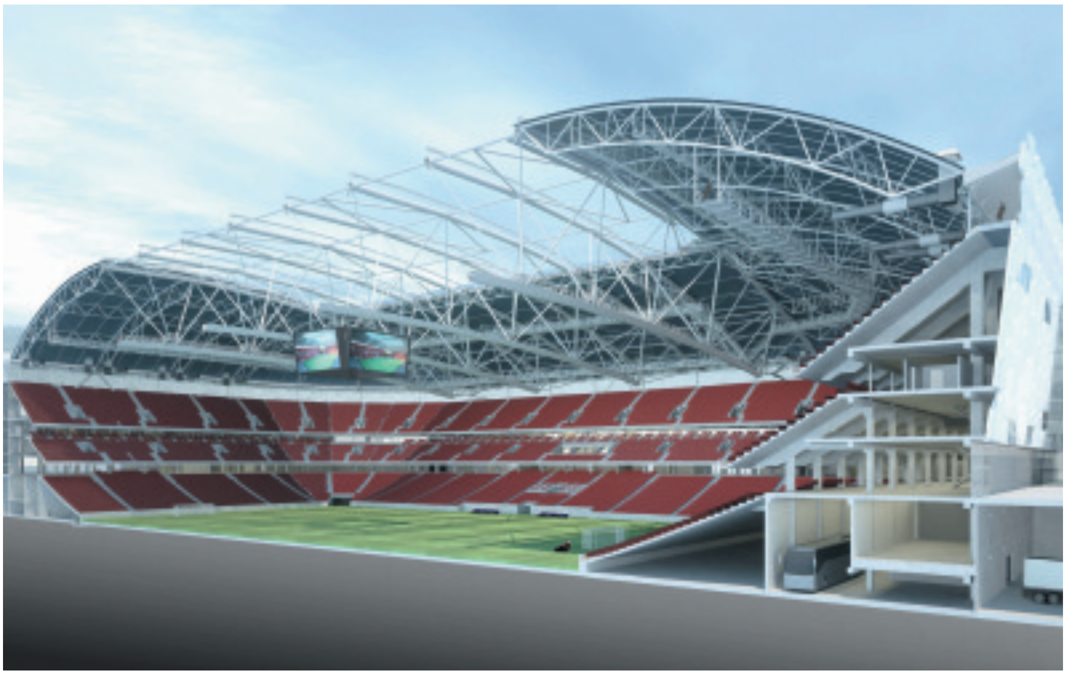
With everything from storage rooms to kitchens and meeting rooms, fire protection in stadia is complex. In some stadia over 50 distinct fire protection systems are required, ranging from sophisticated electronic detection systems, to concealed sprinkler installations, fire extinguishers and small dry systems. In addition, there are various laws and legislation governing fire safety in sports grounds. In the past, many pieces of legislation have covered passive fire safety. In the UK for example, the Regulatory Reform (Fire Safety) Order covers stadia as Large Places of Assembly; Germany has a number of regulations under DIN 4102 and any products used in fire protection must meet EU standards under the Construction Products Directive 89/106/EEC (CPD). Fire safety remains a major concern as capacity at stadia increases and active fire safety is also getting more and more attention

If you cannot stand the heat

One of the most vulnerable areas of a stadium is the kitchen. High temperature cooking oils, deep fat fryers and busy, often-frequented areas with high staff turnover can lead to accidents. In the 1960s, before automatic restaurant fire suppression, kitchen fires were one of the greatest causes of restaurant loss and, in stadia, the hazards are perhaps greater. Deep fat fryers, for example, are more common, as fast food is often found at sporting venues and concerts.

Automated protection systems are essential in these areas. Sprinkler nozzles can be aimed at specific appliances where risk is highest. An overlapping system is also possible, where the targets of different sprinklers overlap, guaranteeing a fire-free zone over a protected area. Custom-built kitchens in stadia require a custom fire system design by a fire engineer, targeted to address the areas of highest risk.

Where hot grease and oil is present, a fire suppressant is needed in place of water in order to cool hot surfaces and prevent re-flash. Another point to bear in mind is that sensitive cooking



equipment requires a Ph neutral suppressant. For other areas, an agent-plus-water fire suppression system is possible to guarantee efficiency in cooling and extinguishing. Designers should consult with their fire protection supplier and authorities with jurisdiction to ensure that the best system is in place in each defined area of the stadium.

Cad design

CAD design is one of the most up-to-date tools in fire suppression. Industry professionals such as engineers and software experts combine their knowledge to create realistic designs. One such system from Tyco, for example, can be used to design the layout of sprinkler systems, calculate hydraulics, create product material lists for designing requirements, allows the user to calculate the time taken to trip a dry valve and deliver water to the remote area, which is useful in evaluating design improvements. Full scale 3D models now allow the user to visualise the system in its entirety and construct virtual models – essential in complex buildings like stadia. The compatibility with BIM is also a useful feature, especially for challenging projects. The software also enables simple calculation of flow equations, including Hazen-Williams and Darcy-Weisbach equations, saving structural engineers time and effort.

Keeping to the code

Regulations are an essential yet challenging aspect in fire protection planning. For example, the Safety of Sports Grounds Act in the UK covers large, complex buildings used for major sporting events with a capacity of 10,000 or more spectators. These buildings require a safety certificate, for which strict criteria must be met. The "Green Guide to Safety at Sports Grounds" contains guidance on a wide range of measures, including stadium capacity and minimum rates of entry and exit. These recommendations are given force of law at individual grounds by their inclusion in safety certificates. Regardless of the various fire safety regulations in each region or country, working with an experienced supplier with good knowledge of these codes, or with software that includes their integration, can save difficulties further down the line.

NFPA 13 (National Fire Protection Association), often used as the standard code for sprinkler systems, details everything from ceiling height to aisle width, and at 414 pages, it is not light reading. The software referred to earlier allows the user to check his or her design in line with codes, penalties and credits and make simple updates to the design until it meets specifications.

Looking good

When designing an ultra-modern stadium, ambient aesthetics are important. Exposed pipes can appear unsightly, and obvious fire protection systems can cause visitors to worry, by calling fire hazards to their attention. Now, sprinkler systems are designed with discreetness in mind. Inconspicuous sprinklers also minimise the chance of damage by vandals, which can be a problem after hours in a large, unoccupied venue, or in an area where large crowds can gather.

Modern sprinklers, such as Tyco's Raven sprinkler, are designed to be as unobtrusive as possible. Available in chrome or white to suit the interior of most environments, they avoid attracting unwanted attention. Tamper resistance is key, especially in venues where alcohol is served and patrons' curiosity may extend beyond normal modes of behaviour. A quick response is also vital, as in a high-capacity venue, a few seconds make all the difference.

Build and maintenance

Stadia are often constructed with a specific event in mind, such as the UEFA EURO 2012 football tournament to be held in Poland and Ukraine. With a strict deadline for construction, simplicity becomes paramount, as does ease of maintenance over the lifetime of the building.

Grooved couplings are one way stadia engineers can save time. They are the fastest method with which to join steel pipes, as the need for two holing with flanges is eliminated. Fire hazards

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involved with welding or brazing are also avoided. Rigid joints provide the same resistance to movement as welding and flanging and pressure responsive gaskets can be used to seal pipe ends.

Another benefit of the grooved system is that retrofitting becomes much simpler. Fire guidelines can change rapidly in response to an accident, which results in new restrictions in fire protection systems. Changing fire system layouts and isolating equipment and piping systems is often necessary, whether for standard maintenance or an unexpected retrofit. Grooved products simplify this process without impinging on safety, keeping the stadium at the pinnacle of fire safety for years to come. These products can also easily be combined with metal framing and fixings for easy installation in a building.

Special environments

Fire damage to server rooms or IT centres on site can be costly. In these areas, commercial suppression units are recommended, due to the many electrical components. This requires choosing a suppression agent that is safe for use in telecommunications sites, computer centres and power generation installations and delivers the extinguishant quickly, minimising damage and downtime.

When using commercial suppression units, environmental impact should not be forgotten. Sustainability is a focus for many new stadia projects – with energy efficient design and construction using recycled rainwater or solar panels on roofs key considerations. The logical choice is a system, such as Tyco's Sapphire that utilises 3M's Novec 1230 fire suppression fluid, that causes zero ozone depletion, minimal global warming potential, and acute and chronic toxicity testing that ascertains that the extinguishant is safe for use in occupied areas.

Fire safety in stadia can be a minefield. A large, multi-purpose venue poses various challenges and risks, and with high-profile disasters in the past, the pressure is on for architects and engineers to stay in the spotlight for the right reasons. Guidance from fire engineers and experienced suppliers is essential in negotiating reams of legislation. The old adage, "safety first", has never been more important.

Swedbank Arena in Sweden

Due to open in 2012, Swedbank arena will be one of the most modern multi-purpose stadia in the world. Construction costs have reached US$ 300,000,000 owing to the high specification of the build. On-site restaurants will be able to seat up to 8000 visitors and there will be 92 VIP boxes overlooking the pitch. The roof will be retractable and stand at a height of 55 metres. With a high specification stadium such as this, maintaining the modern design of the building, ease of construction and ability to retrofit in the future is important.

Grinnell Grooved coupling fire protection products is one solution that has been adopted, which present a number of advantages over flanges or welded systems. These couplings allow for expansion, contraction and deflection of the piping system and the benefit of flexibility can reduce or eliminate the need for expansion joints. Field modifications and retrofitting will be easily accommodated, as couplings and fittings can be rotated, eliminated or added to facilitate modifications.

With pre-fabricated moulded insulation, the groove of the insulation matches the groove of the piping and keeps the system unobtrusive. Concealed sprinklers have also been employed to ensure fire protection is not only the highest standard in safety, but maintains architectural aesthetics. Couplings with elastomer gaskets and pipe end gapping also provide excellent noise and vibration dampening by helping to isolate, dissipate, and minimise noise and vibration transmission throughout the piping system. Metal framing and pipe supports ensured a quick and safe installation and pre-fabricated piping helped limit installation time on site.

In cold environments such as open air arenas, unheated store rooms or parking garages, pipes can freeze, disabling a sprinkler system. In these instances, dry pipe valves are used, where liquid is not introduced to the pipe until the system is triggered. Valves automatically control the flow of water into the sprinkler system which is pressurised with either air or nitrogen. When heat triggers a sprinkler, the loss of pressure causes the valve to open and water flows into the sprinkler system. In this particular instance, software analysis resulted in the installation of fewer than half the number of valves than were initially planned, saving time and cost.

Other fire safety items in use are portable extinguishers throughout the stadium and in areas defined as hazardous to fire, as well as suppression systems in telecommunications and IT rooms. IFP

Wouter Bossink is Sales Director for Fire Protection Water EMEA at Tyco Fire Protection Products

For further information, go to www.tyco-fsbp.com

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Photograph courtesy of the Royal Netherlands Navy

Graham Collins

Ship-Shape Safety

Fire can be devastating, nowhere more so than on a ship. Cruise liners and ferries carry hundreds passengers and crew that may need to be kept safe while the fire if fought, or be evacuated from the vessel, while cargo vessels – many carrying highly flammable cargos – are high-hazard environments for crews and can jeopardise the safety of ports and harbours.

Next to foundering due to collision, grounding or hull structural failure, fire is the largest hazard for crew and passengers on a ship.

The most apparent difference between a land-based fire and one that breaks out at sea is that, once a ship is at sea, fire safety is almost entirely dependent on the ship's design and passive fire safety measures, the fire detection and fire suppression equipment installed throughout the vessel, the training of the crew, and their intimate knowledge of the particular vessel.

The stark reality is that ships of all types and tonnage have to be self-sufficient as far as fire safety is concerned because, other than when in port, even limited help is unlikely to be available and fast evacuation is equally improbable. In all likelihood, if a fire breaks out, the effectiveness of the fire detection and suppression measures are all that stand between survival and potential disaster.

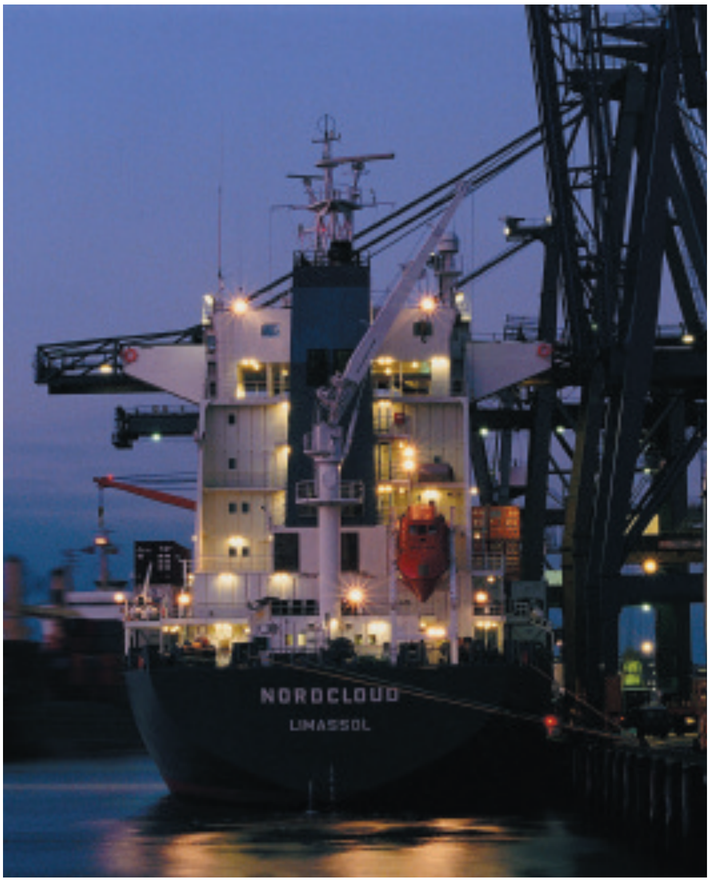
Studies have found that both the probability and consequences of a ship fire are influenced by three factors:

- Nature of the space: engine rooms and galleys have the highest incidence of fire, and larger engine rooms are a greater risk than smaller engine compartments.
- Nature of the vessel operation: tankers and passenger carrying vessels have far higher consequences if fire occurs.
- Distance from the coast: determines the level of external support that can be relied upon. Vessels operating further from the coast need better fire safety measures.

Maritime fire safety regulations

There is a mass of regulations and marine standards that relate to safety at sea. However, the IMO [International Maritime Organisation] is a specialised agency of the United Nations, and its International Convention for the Safety of Life at Sea, or SOLAS, is generally regarded as the most important of all of the international treaties relating to the safety of merchant ships.

In 2010 a number of amendments to the SOLAS regulations were introduced following a



ten-year review of passenger ship safety. This reviewed the effectiveness of the then current regulations, focusing particularly on the recent generation of large passenger-carrying vessels.

The result of this study was a greater focus on fire prevention in vessels, and the strategy that the design of passenger ships should, in future, enable passengers and crew to be stay safely on board in the event of fire, and not require evacuation until the ship reaches port. The amendments to the SOLAS regulations restrict the amount of combustible material in the construction of new vessels and the conversion of passenger ships, and apply to all ships – including vessels built before existing regulations were in place – with specific measures for passenger ships, cargo ships and tankers.

These latest amendments follow on from amendments that came about in 2002 that also focused on fire prevention measures. Embracing the three-pronged mantra of "prevention, detection and suppression of fire" the regulations embrace every aspect of fire safety onboard, with very specific requirements for suppressing and quickly extinguishing fires in the place of origin. The amended regulations require the installation of fixed fire-extinguishing systems, for fire-extinguishing appliances to be readily available, and that suppression equipment is easy to use, accessible, maintained and fit for purpose.

Prevention

Preventing a fire onboard ship is, in part, dependant upon the type of vessel and any cargo that may be being carried. In addition to use of fire retardant and fire resistant materials in the construction and furnishing of the vessel, good housekeeping, crew training and regular fire drills can play a vital role in achieving fire safety. Working areas should be kept under lock and key when not in use or manned, denying access to any unauthorised personnel. Flammable liquids should be properly stored, fuel handling systems should be regularly maintained and leaks should be rectified immediately. Naked flames should be banned and explosion-proof equipment should be used in appropriate areas.

Detection

Shipboard fire detection now uses a wide array of sophisticated marine-approved technologies, similar to those used for land-based applications. These include: smoke, heat and flame detectors; video smoke detection linked to CCTV equipment, monitored from the ship's bridge; and in enclosed-equipment areas, tube-based combined detection and suppression.

Ocean-going vessels have to contend with a variety of environments. These include: extreme weather variations; differing humidity conditions; exposure to salt water; and with some cargoes, excessive dust and atmospheric pollution. Ships are also prone to be designed with a labyrinth of narrow corridors and passageways and difficult-to-access compartments below decks, making the selection of the most appropriate detection technology and the positioning of detection devices a task requiring specific ship environment experience and skill.

Suppression

In terms of fire suppression, sprinkler systems and watermist systems are in widespread and effective use in ships' public areas, such as restaurants, stair wells, hallways, bars, theatres and cabins. These systems are supplemented by the extensive use of portable fire extinguishers and it is not exceptional for a large passenger-carrying vessel to have upwards of 300 portable extinguishers spread throughout the ship.

Deck foam systems and machinery and engine room void-filling foam systems are commonly used on petrochemical tankers. These void-filling foam systems are operated automatically or manually from the bridge and use air from inside the machinery space to generate high-expansion foam that smothers the fire, plus it provides the temperature reduction effect of water fog. High-hazard and survival-critical areas can also be protected by gaseous systems of one kind or another. In addition to engine rooms and machine enclosures, these areas include switchgear and communications compartments, and command and control areas such as the ship's bridge.

First-response protection

It is a widely accepted truism that prompt action often has a significant impact on the final outcome

of what may start as a small fire. This applies to all fires, but is particularly the case with shipboard fires where the only available means of tackling a blaze are the systems the ship possesses. Fast-response first aid firefighting in the form of portable extinguishers is, therefore, of paramount importance.

Watermist and sprinkler protection

The activation of a watermist system results in an immediate lowering of the temperature, protecting crew and passengers from radiant heat. Due to the nature or watermist, it permeates into every space, protecting the ship itself and increasing surviving time of those caught in the affected area. The small amount of water used reduces water damage to a minimum. When used in engine rooms, watermist systems also rapidly wash smoke particles and combustible gases.

Water sprinkler systems are most frequently found on the cargo decks of Ro-Ro (Roll-on, Roll-off) vessels, and activation is triggered by the breaking of the sprinkler head by heat from the fire. This causes water to flow out to activate the water flow alarm device, which in turn activates the alarm system.

Total flooding gaseous protection

CO_2 [Carbon Dioxide] is also a first-rate extinguishant and is still widely relied upon; its use does however need to be careful controlled, because, in fire extinguishing concentrations, it is lethal, so it is not suitable for total flooding applications in normally occupied rooms or enclosures. However, it is an ideal total flooding solution when seeking protection for unoccupied areas of a ship, provided there are appropriate safety lock-off devices and that access – even during maintenance periods – can be adequately controlled.

Even in such applications, it is essential to ensure that the flooded areas are adequately ventilated after discharge of the CO_2 to prevent the accidental exposure of personnel to dangerous levels of CO_2 when investigating the cause of the discharge. Nevertheless, CO_2 arguably remains the most commonly used gaseous suppression agent for engine compartments in merchant shipping, and in all probability, CO_2 has safely extinguished more fires than any other gaseous suppression agent.

Despite the effectiveness of CO_2 systems, new chemical suppressants have come onto the market in recent years that do not have CO_2's toxicological limitations. One such agent is a fire suppression fluid that is stored in containers as a low vapour pressure fluid that, when discharged, transmutes into a colourless and odourless gas. Typical total flooding designs for marine applications use a 5.5 percent concentration by volume of the fluid, well below the agent's saturation or condensation level. When discharged, the agent is dispersed through natural ventilation.

No room for apathy

The importance of getting ship fire safety right can be seen from the latest statistics. According to the International Union of Marine Insurance, total marine losses were down by ten percent in 2009 (the most recent year for which figures are currently available) with the lowest number of vessels ever declared to date. This, nevertheless represented a substantial financial loss, and the decline did not relate to the actual gross tonnage lost, some 463,000 tons gross, an increase of 25 percent on the corresponding period in 2008.

The chairman of International Union of Marine Insurance's facts and figures committee summed it up saying: "We have seen a significantly higher frequency of serious losses in the period 2006-2009 than in any of the preceding years. This is the fourth highest total of serious losses reported in one year out of the last 16."

And remember, these are losses, and take no account of damaged ships that were not complete losses. IFP

Protecting Railway Station Steelwork

Charles Taylor

PPG Protective and Marine Coatings

With the trend for using exposed steel in innovative architecture, there came an increased need for passive fire protection to retain structural integrity. At the same time, the development and introduction of the European Standard EN 13381-8 for passive fire protection systems and the demand for internationally certified coating systems have resulted in a more selective use of intumescent coating systems

The use of high-performance passive fire protection enables elegant steel designs to be built where the steelwork is an essential part of the aesthetic appearance. Also, steelwork in restored buildings heritage structures can remain exposed with the use of site-applied thin-film intumescing fire protection coating systems are used to provide enhanced fire protection.

Spain's Atocha Station in Madrid is the largest in the country with more than 35 million passenger movements a year. It is also the main nucleus of the nation's high-speed rail network that, at 2230 kilometres, is Europe's longest high-speed rail network and the world's second longest. The station was built in 1851 and hit the world's headlines when in 2004 it was the site of a terrorist attack, killing 191 people and wounding 1800.

In 2009, the European Investment Bank agreed to provide €5 billion to develop high-speed rail networks in Spain, and expansion of Atocha Station is one of the projects covered in the agreement. José Rafael Moneo Vallés was the architect responsible for the station's first redevelopment in the 1980s, and is also in charge of designing the latest improvements.

The most characteristic design feature of the Station is the blending of a contemporary enlargement with the nineteenth century style façade and the rigid riveted roof. The station and passenger experienced is enhanced by the inclusion of a tropical garden that covers 4000 square metres with more than 500 species.

The first phase of the station's extensive enlargement and redevelopment was completed last December. The €200 million phase took almost two years to complete and included the construction of a new terminal.

Passive fire protection

Structural considerations and building legislations meant that a thin-film passive fire protection system was adopted to satisfy all of the fire protection, corrosion protection and decorative appearance requirements.

The construction company, Dragados, subcontracted the application of the intumescence protection to Control Ignífugo, S.A. (CISA) that, in turn selected PPG Protective & Marine Coatings's Steelguard FM 585 water-based intumescent coating. Deciding factors cited as being in favour of this particular solution included its simple application, competitive thicknesses, and the absence of solvents that might otherwise contaminate the atmosphere in adjoining area, affecting passengers.

In order to protect the 50,000 square metre of steel structure with the 30-minute fire protection demanded by the Official Central Administration, €300.000 of Steelguard FM 585 and Steelguard 2458 finishing were consumed. Additionally, a 2000 square metre galvanized steel structure in the main hall of the station was protected with SigmaCover 280 and SigmaDur 1800 anti-corrosive and decorative coating.

Cellulosic fire protection

Intumescent coating systems that comply with many national standards are today available for various levels of fire protection, climatic exposure conditions and application techniques. The development of PPG's Steelguard thin-film intumescent coating, for example, started in the mid-1980s with the creation of an external-grade intumescent coating and development of application techniques for off-site-applied intumescent coatings for the construction industry. Such coatings are noted for their exceptionally smooth surface and availability in a wide range of colours.

Factories, sports halls, hospital and schools are just a few of the buildings that are designed where the structural steel is clearly visible. However, if a fire breaks out, the potential for disaster is frightening. Within minutes, unprotected steel can reach the critical temperature that causes it to lose stability and collapse.

Intumescent coatings work by expanding at high temperatures, from a very thin, lightweight coating, into a thick, foam-like layer that insulates the steel from the fire and maintains its stability, providing vital extra time for people escape and allow firefighters to endeavour to save the building itself.

Fire engineering

Large projects frequently require additional fire engineering to meet all fire protection requirements, in which the coatings supplier, designer and contractor develop solutions for specific applications. In these cases, an experienced coatings supplier, equipped with the latest laboratory facilities for formulating and fire testing, custom-made solutions can be developed to ensure dependable and compliant fire protection.

Through intensive research, PPG for example, has developed proprietary coatings and processes for steel and concrete protection that greatly reduce the use of chemicals that are potentially harmful to humans and the environment. The majority are environmentally designed with high-solids, solvent-free and water-based technology, reducing the possibility of environmental pollution and enhancing workers' safety.

In some European countries the use of solvent-based coatings is restricted by limitations on the solvent content in the products' formulations. On occasions, the use of solvents in enclosed buildings is even completely prohibited and water based primers, intumescent coatings and finishes are the only options. This use of water-based coatings may influence the choice between on-site or off-site coatings.

Coating choices

Specifiers and contractors must choose the appropriate coatings to ensure construction integrity, corrosion protection, weathering resistance, fire resistance and appropriate decorative finish aspects. Products must be selected with regard to their individual performance characteristics such as ease of welding and corrosion resistance. With the correct product selection and system combinations, the corrosion resistance and weather stability of both the steel primers and the intumescent coatings will be ensured.

Customer-focused solutions

The industry constantly faces new demands, which is why it is important to work closely with customers and the world's leading architects and engineers to continuously improve the value and effectiveness of all our fire protection products.

This drive and pursuit of excellence delivers coatings that are unsurpassed in performance and protection among asset owners, contractors, fabricators and applicators across the globe, and helps customers meet the challenges they face today, and tomorrow. IFP

Charles Taylor is Regional Project Manager EMEA at PPG Protective and Marine Coatings

For further information, go to www.ppgamercoatus. ppgpmc.com

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Compliance, Respe
Are Key Issues

Brian Robinson

Association for Specialist Fire Protection

Perhaps the biggest challenges facing the UK fire industry are apathy, ignorance and denial, and when they conspire together, the risk to life and property in the event of fire is pretty much guaranteed.

While, in the UK, all the building blocks are in place to ensure that the process of designing, contracting, inspecting and managing the fire protection process are "fit for purpose", the opportunity to ignore, or worse, flout the guidelines and regulations, remains ever present and seemingly unchallenged.

A recent survey of the Association for Specialist Fire Protection's (ASFP) membership questioned how often they witnessed incorrect installation by others of fire protection on site. 50 percent replied "on some occasions", but perhaps more alarming, the other 50 percent said "on most occasions". Not exactly a ringing endorsement for the process of fire safety, so is it really the case that fire is not regarded as a matter to take seriously, and what has changed during the past 12 months?

In July the UK's Fire Minister, Bob Neil, set up a review to determine the future of the wider fire sector and its inter-relationship with other key services and industry. Known as "Fire Futures", this strategic review was intended to develop a range of options for the fire sector and make recommendations as to how these should be taken forward. The review was divided into four work streams:

- Localism and accountability.
- Role of FRS – delivery models.
- Efficiency, effectiveness and productivity.
- National interests.

The regulatory framework is substantially fit for purpose. The key issue is securing compliance with the regulations and guidance. Outside the core fire safety sector it is evident that there is a significant lack of respect for the regulations and this is substantially responsible for a failure to follow compliance.

One of the key issues of the group concerned with national interests was to consider fire "in the round", with views, opinions and aspirations of the whole fire sector. Around thirty industry bodies and associations were consulted for their views and guidance.

The group's proposal is that the fire sector is not just about fire and rescue service or fire and rescue authorities. It is a much wider group and fire safety provision in buildings needs to be based on a consistent and connected process with continuity along the chain from design, through specification and construction, to occupation, including extension of the best practice principles to existing buildings and refurbishments.

The regulatory framework that the fire industry works within is seen as substantially fit for purpose. The key issue, however, is securing compliance with the regulations and guidance. Furthermore, outside the core fire safety sector it is evident that there is a significant lack of respect for the regulations and this is substantially responsible for a failure to follow compliance. In addition, there is currently a perceived low level of competency in relation to fire safety and the built environment.

There is no common qualification framework that covers building and fire safety competencies. Whilst the fire and rescue service carries out

ct And Competency

building safety checks, no single organisation can take responsibility for awareness of fire safety among building designers, constructors, owners and occupiers. In submissions to the work stream the industry considers that this is a campaign that can be taken on by the sector. But to achieve its ambition it will need to come together more closely and be less introspective.

There must be a much wider dialogue with those outside the core specialist fire safety sector who are not fire specialists, but who in practice are responsible for delivering fire safety. It has been estimated that there are at least four million businesses that fall under the Fire Safety Order. It is therefore clear that the sheer volume and level of the potential workload is excessive with an unreasonable expectation that the fire and rescue service is equipped, resourced or qualified to take on the burden.

The increasing development and application of risk-based design approaches, under the banner of fire safety engineering or expert judgment, continue to be of concern to the fire sector. Such situations occur where the building is too big, too complex, or too innovative to fit comfortably within the more rigid standard and there is a tendency for the techniques to be applied, more and more beyond their limits of applicability, without adequate scrutiny and essentially outside the scope of approved practice.

The concern is that the boundaries are being increasingly pushed into areas of uncertainty, where applicable supporting knowledge is at best weak and at worse, non-existent. The risk is that fire safety margins are being increasingly squeezed; with much less room for error should the unexpected happen.

There is undoubtedly an important role for industry-endorsed third party certification schemes. But the schemes must themselves be fit for stated purpose and properly accredited. The optimum effect will only be achieved by officially mandating third-party independent schemes, or by receiving much wider specifier and client endorsement by insisting on a third-party scheme to mitigate risks by specification.

The fire industry submission takes account of all these points and proposes a core strategy for reducing fire risk within the built environment. The underlying message must be that fire safety provisions in buildings need to be based on a consistent and connected process. Unfortunately, as already explained, the process as it currently operates is fragmented and disjointed. Likewise, the guidance along the chain is either absent or disconnected from one stage to the next, significantly lacking consistency and profile, such that the guidance that does exist can be too easily dismissed and ignored.

There must be a much wider dialogue with those outside the core specialist fire safety sector who are not fire specialists, but who in practice are responsible for delivering fire safety. It has been estimated that there are at least four million businesses that fall under the Fire Safety Order.

The industry has therefore stated that it will:

- Provide sector guidance, from start to finish, to eliminate the disconnect between Building Regulations and the Fire Safety Order.
- Prepare, support and deliver appropriate educational programmes to train, educate and spread its sector knowledge.
- Mobilise those outside of the sector in the form of awareness programmes.
- Develop and facilitate personal competency, skills and qualification processes.
- Undertake the writing of sector codes of conduct/practice and expected standards of behaviour by setting the principles and defining the industry standards.

In achieving these goals we are taking the view that there is no need for further significant legislation or regulation and that the fire industry should take the lead on the application of knowledge, linked to competency, certification, data sharing and awareness programmes. In reality, of course, the collective UK fire industry already invests thousands, if not millions, of pounds every year in man hour expertise, supporting these objectives.

Significantly, the direction now proposed by the fire industry's "plan of action", to address the requirements identified within the Fire Futures process, will come at no direct cost to government, as these objectives will continue to be funded directly by the industry. IFP

Brian Robinson is President, Association for Specialist Fire Protection

For further information, go to www.asfp.org.uk

Lighting The Way To Safety

Since the ghostly footprints of evacuees lost in darkness at Dusseldorf Airport in 1996, the necessity for safety way guidance systems has become ever more apparent.

Jim Creak

Jalite Plc

According to International Standard ISO 16069, the definition of a safety way guidance system (SWGS) is: "a system to provide conspicuous and unambiguous information and sufficient visual cues to enable people to evacuate an occupied area in an emergency, along a specified escape route by using a comprehensive arrangement of visual components, signs and markings."

"Low location", relating to the safety way guidance system, is the: "installation position at floor level or at a short distance above floor level for safety signs and other safety way guidance components." This makes such systems close to, and reassuring to, evacuees and reduces dependence on long observation distances for critical information.

The list of tragedies due to fire and the incidents where escape from fire and smoke is a daily report, highlight the benefits of low location way guidance systems (LLL or SWGS). The management of escape and the need to give unambiguous information to identify and locate vital safe areas within the built environment is well documented as part of the inquiry and report after the vast majority of such incidents.

Low location way guidance systems allow an escape route to be still perceived when: power loss occurs instantaneously; when any installed emergency lighting fails; and when smoke obscures any or all of the normal lighting. A number of tragedies have lead to the development and growing acceptance and installation of low location lighting with supporting, consistent and recognisable direction signage to identify the escape routes. Below are some examples of the major tragedies that have influenced this development:

1985 – Engines on a British Airtours flight catch fire prior to take off and fire spreads to the cabin. Of 136 occupants, 48 died from smoke inhalation.

1987 – Kings Cross fire in London claimed 31 lives. Poor evacuation procedures and smoke inhalation were the main causes of loss of life.

1990 – Cruise Ship "Scandinavian Star" catches fire. 184 perished, mainly due to smoke inhalation with smoke obscuring exit signs greatly hindering passenger evacuation.

1993 – The World Trade Centre came under attack, a bomb detonated in the underground garage killing six people and in the ensuing evacuation more than 1,000 were injured.

These events highlight the importance of having way guidance systems in low locations and its use in situations where the environment brought to light the dangers of fire and risks of losing both normal and emergency electrically powered lighting. These events also made apparent the dangerous flaw in the evacuation continuity planning of buildings. Delayed evacuation times due to unfamiliar layouts and smoke-obscured or absence of coherent directional signage, meant more people were overcome by toxic fumes, the primary killer in a fire.

With reference to the 1993 World Trade Centre bombing, the explosion knocked out the emergency power, including that to the emergency lighting. In the investigations, a recommendation of marked simplicity was made: In order to bypass the dependency on electricity for lighting, use photo-luminescent escape (egress exit) path marking.

The advantage of using photo-luminescent signage and way guidance systems is that once it has been charged, it will work, regardless of the conditions. It was as long ago as 1989 that Dr G Webber carried out research into photo-luminescent markings for escape routes. In 1999 a totally independent study by the National Research Council of Canada (NRCC) showed that egress speed using a photo-luminescent low location way guidance system was comparable to that in the other identical stair wells that were fully lit or lit by emergency lighting. They concluded that photo-luminescent pathway marking: "'appears to be a cost-effective addition or even a potential replacement for traditional electrical emergency lighting, since it does not consume energy, requires no wiring, needs minimum maintenance and is totally reliable, provided it is installed in locations where permanent full lighting is provided."

There are no electrical components or batteries to maintain or that could fail during an emergency. Continuous lines of light throughout corridors and stairways and at or near floor level could prove most effective, as this is the last place to be totally obscured by smoke.

In the wake of this disaster, and as a direct result of the enquiries and investigations brought about by the threat of further attacks, the New York Department of Buildings (NYCDOB) passed Local Law 26. Photo-luminescent Way Guidance Systems, clearly beneficial in evacuation both as an aid and backup, became a requirement in all high-rise office buildings across New York. This legal requirement had to be met by no later than July 2006 for existing buildings and a requirement for all future buildings of this Class in the City. However, the task became a problem to building owners who were unfamiliar with the technology, and it was this problem that influenced the NYCDOB to develop its own standard – RS 6-1.

RS 6-1 outlines the requirements of way guidance systems and specifies that it is to be a photo-luminescent system. It also placed requirements on the quality of the system to be installed. A taskforce representing the leading authorities over a range of disciplines were assigned to develop a standard of excellence for photo-luminescent way guidance systems, which prepared and published the standard which the NYCDOB implemented via its testing standard for approving systems, known as Materials and Equipment Acceptance (MEA) process.

The International Standards Committees have influenced domestic standards across the world to provide cohesive guidance for building managers. Speed of egress is essential for effective evacuation and the use of safety signs that have been tested in accordance with ISO 9186-1 and standardised under ISO 7010, are now part of the recommendations under ISO 16069:2004 Graphical symbols – Safety signs – Safety way guidance systems (SWGS)

Low location way guidance systems allow an escape route to be still perceived when: power loss occurs instantaneously; when any installed emergency lighting fails; and when smoke obscures any or all of the normal lighting.

The concept of photo-luminescent is sound, the application is simplicity in itself, and the continued maintenance of these systems is both easy and extremely cost effective. The certification of photo-luminescent material is absolutely vital as not all materials available will meet the strict requirements for application; some materials are used for novelty applications, a world apart from safety products for escape route systems.

All photo-luminescent materials delivered for low location way guidance systems and life saving appliance, location and identification signs should be accompanied by luminance performance test data. This should be in accordance with ISO 17398 and other standards such as, for marine use, in ISO 15370 giving actual performance at 25 lux or the chosen illumination condition using commonly used fluorescent light excitation.

September 11th 2001 is a day forever in people's memories. Most will remember the terrifying events that befell the twin towers on this day. The hijacking and subsequent crashing of commercial airliners into the World Trade Centre towers caused a raging inferno that soon led to the collapse of both structures and the deaths of over 2500 people. The twin towers had been fitted with photo-luminescent escape path marking and had its first great live trial. The results were decisively in favour, as is evidenced by the number of survivors who used the "yellow brick road" to safety.

Safety way guidance systems consist of a number of important components with a consistent purpose – continuous and close proximity guidance throughout the escape route.

The concept of photo-luminescent way guidance systems has been conceived out of tragedy, believed to work by the pioneers of its uptake, tested to work by safety research professionals, proven to work effectively by incident and made a standard of safety as a result. The system is easy to test, certify and accredit under independent third-party quality assurance schemes:

- NFPA 101 – Life Safety Code.
- UL-924 – Standard for Emergency Lighting and Power Equipment.
- NYC MEA approval – Photo-luminescent Products in High Rise Application.
- ISO 15370 Ships and Marine Technology – low location lighting on passenger ships.

Most important is proof of effectiveness; not when emergencies arise, but by the simple flick of a switch each time you turn off the lights. Its presence is a constant reminder of the need for occupants to be aware of safety provisions and evacuation training, among other measures aimed to save their lives in an emergency. IFP

Jim Creak is a director of Jalite Plc

For further information, go to www.jalite.com

Graham Collins

Fire Suppression – Keep It Clean

The United Nations Environment Programme has recently published a report on clean agents and the next edition of APF will carry an exclusive article on the report written by one of the committee's members, John O'Sullivan. As a prelude, Graham Collins, IFP's Editor, overviews the major developments since the Montreal Protocol with Janus Fire Systems' Fred Hildebrandt.

Right up to the closing years of the 1960s, CO_2 [carbon dioxide] was pretty much the only available "clean" – more on that word later – gaseous fire-suppression agent. Halon gases became commercially available in the late 1960s and were soon adopted as an alternative to CO_2, particularly for the protection of areas where people might be present. This was because CO_2 is most certainly not suitable for total flooding applications in normally occupied rooms or enclosures, as its discharge in fire extinguishing concentrations is lethal to room occupants.

However, as Fred Hildebrandt, Director of Sales at Janus Fire Systems – a man with 34 years gaseous agent suppression system experience – points out: "CO_2 continues to this day to be a popular, versatile and effective fire suppression agent for the total flooding of unoccupied, enclosed, special-hazard areas such as power generation equipment, spray booths and turbines. When discharged, it leaves nothing behind to damage sensitive equipment, and with no agent clean-up required, business-critical installations can be up and running again in the shortest possible time."

It remains popular also because it can be compressed into a liquid state which, when maintained under pressure, requires a smaller storage footprint than many other gaseous suppression agents. An essential consideration though is to ensure that the flooded areas are adequately ventilated after discharge to prevent the accidental exposure of personnel to dangerous levels of CO_2 when investigating the cause of the discharge.

Not that CO_2 is free from misunderstandings. It is close to impossible to go anywhere in the world today without hearing carbon dioxide mentioned, often in the same breath as terms such as carbon footprint and global warming. So it is easy to

forget that CO_2 continues to be a very effective fire suppressant and that, in all probability, has been used to safely extinguish more fires in unoccupied areas than any other gaseous suppressant for the better part of 100 years.

So, what are the facts? Carbon dioxide occurs naturally in the atmosphere, and the gas used as a firefighting suppressant is extracted from a number of natural CO_2 producing processes. It is then stored until it is needed. Also, its use in fire protection is insignificant compared with the emissions and environmental damage caused by an uncontrolled fire, or the huge quantities of CO_2 emitted into the atmosphere as a by-product of many industrial processes, particularly in some of the fast-developing emerging nations.

Halon and the Montreal Protocol

From the late 1960s until the signing of the Montreal Protocol halon was a much favoured gaseous fire suppressant, particularly for occupied areas such as computer suites, telecommunications facilities, areas containing high-value electronic equipment, document storage, archives and research facilities.

Of the halons, Halon 1301, a CFC (chlorofluorocarbon) with the chemical name of bromotrifluoromethane and a chemical formula CBrF3, was by far the most popular as a gaseous fire suppression agent. It extinguished fire by chemically interrupting the chain reaction inhibiting flame propagation. Halon 1301 was a first-class fire suppressant but, unfortunately, the same could not be said for its environmental credentials.

By the mid-1980s scientific evidence showed that these halogenated hydrocarbons were contributing to the depletion of the stratospheric ozone layer. Halon 1301 had ozone depletion potential of 12, global warming potential of 6900, and an atmospheric lifetime of 65 years that was wholly unacceptable to the international community. So, despite its undeniable effectiveness as a suppression agent, Halon 1301's demise came when the Montreal Protocol came into effect in 1989.

The Montreal Protocol, or to give it its full name, the Montreal Protocol on Substances that Deplete the Ozone Layer is a protocol to the

Vienna Convention for the Protection of the Ozone Layer. It is a treaty aimed at protecting the stratospheric ozone layer by phasing out the production of numerous substances believed to be responsible for ozone depletion. This included CFCs – such as Halon 1301 – and HCFCs (hydrochlorofluorocarbons), resulting in a flurry of activity to develop alternative, sustainable, environmentally-acceptable and long-term agents. Some turned out to be more successful than others.

Kyoto and Copenhagen

The next chapter came in 1997 with the signing of the Kyoto Protocol on climate change – a protocol to the United Nations Framework Convention on Climate Change (UNFCCC or FCCC), aimed at achieving "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system", fighting global warming and establishing the goal of reducing greenhouse gas emissions.

The United Nations Climate Change Conference – more commonly known as the Copenhagen Summit – took place in 2009 in Copenhagen, Denmark. It was the 15th "Conference of the Parties" to the United Nations Framework Convention on Climate Change and the 5th "Meeting of the Parties" to the Kyoto Protocol. The aim was to agree a framework for climate change mitigation beyond 2012, the date on which the Kyoto Protocol is set to expire. It followed the Climate Change: Global Risks, Challenges and Decisions scientific conference that took place in March of last year. The consensus of opinion was that the Copenhagen Summit failed to live up to many people's expectations.

Halon replacements

One firefighting agent that became particularly popular following the Montreal Protocol was FM-200 (HFC-227ea), a halocarbon or HFC (hydrofluorocarbon) suppressant with the chemical name of heptafluoropropane. Another popular halocarbon suppressant is HFC-125/FE-25, which has a chemical name of pentafluoroethane. With either, there is no risk of thermal shock damage to delicate equipment, they are electrically non-conductive and non-corrosive, leave no oily residue or deposits to damage computer software, data files or communications equipment so clean-up operations are unnecessary following discharge.

However, the Kyoto Protocol specifically sought to cap the emissions of greenhouse gases from, among others, HFCs that almost inevitably has led to questions continuing to be asked about its viability. Firefighting though, as Fred Hildebrandt underlines is: "A very minor user of HFCs, and the applications causing the most concern for groups such as the United Nations Environment Programme are insulation foams, air conditioning units and refrigeration."

He continues: "Both FM-200 and HFC-125/FE-25 extinguish a fire through heat absorption; they are zero ozone depleting, have global warming potentials significantly lower than Halon 1301, and have far shorter atmospheric lifetimes." He explains: "Global warming potential is a measure of how much a given mass of a gas is estimated to contribute to global warming. CO_2 has a global warming potential of 1 and is the baseline against which all greenhouse gases are compared."

Inert gas option

Understandably, the Montreal and Kyoto protocols focused greater interest on inert gases that can justly claim to have no environmental downside. They have zero ozone depletion potential, zero atmospheric lifetime and zero global warming potential. Inert gases are non-toxic, they will not harm sensitive electronic equipment, art treasures or documents, and are safe to use in enclosed areas where people may be working.

These gases are a non-conductive and non-corrosive blend of naturally occurring gases – such as a combination of N (Nitrogen), Ar (Argon) and CO_2 – or, less frequently, a single naturally occurring gas. They work by lowering the oxygen content of the protected area to a point that will not support combustion but is sufficient to sustain human life, in much the same way as CO_2, but without the lethal implications.

So, why have inert gases not been overwhelmingly adopted? According to Janus' Fred Hildebrandt, the fact of the matter is that HFCs are ideal fire fighting agents and are most appropriate where speed of suppression, space for cylinder storage and weight are the determining factors. Inert gases are most appropriate where speed of discharge is considered to be of less importance and where there is considerably more space available for cylinder storage. He argues: "Typically, an inert gas system requires up to seven times the storage space of FM-200 and ten times the storage space of a comparable Halon 1301 system." That being said, inert systems are certainly popular with companies where specifying a zero ozone depleting, non-chemical product is of paramount importance.

According to Janus' Fred Hildebrandt, the fact of the matter is that HFCs are ideal fire fighting agents and are most appropriate where speed of suppression, space for cylinder storage and weight are the determining factors. Inert gases are most appropriate where speed of discharge is considered to be of less importance and where there is considerably more space available for cylinder storage.

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Post-Kyoto agents

Following the Kyoto Protocol it became clear that there was a need for a chemical suppressant that met the industry's needs, while satisfying the environmental lobby. One of the most successful of these is 3M's Novec 1230 Fire Protection Fluid, a fluid-based system that is said to use sustainable, long-term technology.

Novec 1230 is a fluorinated ketone or fluoroketone – a low toxicity, low vapour pressure fluid, with a boiling point of 49°C, that exists as a liquid at room temperature, with a chemical structure of $CF_3CF_2C(O)CF(CF_3)_2$. This molecule was chosen because it provides an ideal combination of fire extinguishing performance, toxicological and environmental properties. The suppressant is stored as a low-vapour-pressure fluid that, when discharged, transmutes into a colourless and odourless gas. Typical total flooding applications use a concentration of the fluid that is well below the agent's saturation or condensation level, and the fluid has the lowest design concentration of any viable Halon 1301 chemical alternative.

While certain halocarbons and inert gases are used at design concentrations that are below the NOAEL or No Observed Adverse Effect Level, with safety margins from seven percent, no other fire suppression solution comes close to Novec 1230's safety margin. NOAEL is an important measure, as it represents the level of exposure at which there is no biologically or statistically significant increase in the frequency or severity of any adverse effects.

Fred Hildebrandt cites the key benefits of Novec 1230 as: "Novec 1230 is a high performance fire-extinguishing agent with a negligible impact on the environment, with an insignificant global warming potential – lower than any of the halocarbon agents acceptable for use in occupied spaces." He continues: "When discharged, Novec 1230 leaves nothing behind to damage sensitive electronic equipment or documents. Compared with Halon 1301's ozone depletion potential of 12, Novec 1230's is zero; its global warming potential is 1 against Halon's 6900; and the agent's atmospheric lifetime is five days, contrasting with Halon's 65 years. It contains neither bromine nor chlorine and, significantly, Novec 1230 is not included in the basket of 'greenhouse gases' identified by the Kyoto Protocol."

What is clean?

But, with so many options on the market, what is "clean"? The USA's NFPA (National Fire Prevention Association) 2001: 2008 (*Standard on Clean Agent Fire Extinguishing Systems*) covers both halogenated agents and inert gases. The 2008 update includes the latest toxicity limitations along with complete facts on the different types of halogenated and inert gaseous extinguishing agents on the market today. Another important feature of this edition is that it includes additional references to US EPA (Environmental Protection Agency) SNAP (Significant New Alternatives Program) approved agents.

SNAP evaluates and regulates substitutes for the ozone-depleting chemicals that are being phased out under the stratospheric ozone protection provisions of the USA's Clean Air Act. Under the Clean Air Act, the EPA, which was created in 1970 in response to growing public demand for cleaner air, water, and land, is authorised to identify and publish lists of acceptable and unacceptable substitutes for Class I or Class II ozone-depleting substances. Novec 1230, for example, is listed as "acceptable without restrictions". Other sources of information are the Europe Commission's Joint Research Centre Institute for Health and Consumer Protection's ELINCS (European List of Notified Chemical Substances) scheme, BS ISO 14520 (*Gaseous fire-extinguishing systems. Physical properties and system design*) and the Australian Standard AS ISO 14520.2009.

Few would doubt that the drive for ever improving environmental performance is inexorable. Perhaps John O'Sullivan's article in the next edition of APF will help us all to see just how far we still have to go. IFP

Fred Hildebrandt is Director of Sales at Janus Fire Systems

For more information go to www.janusfiresystems.com

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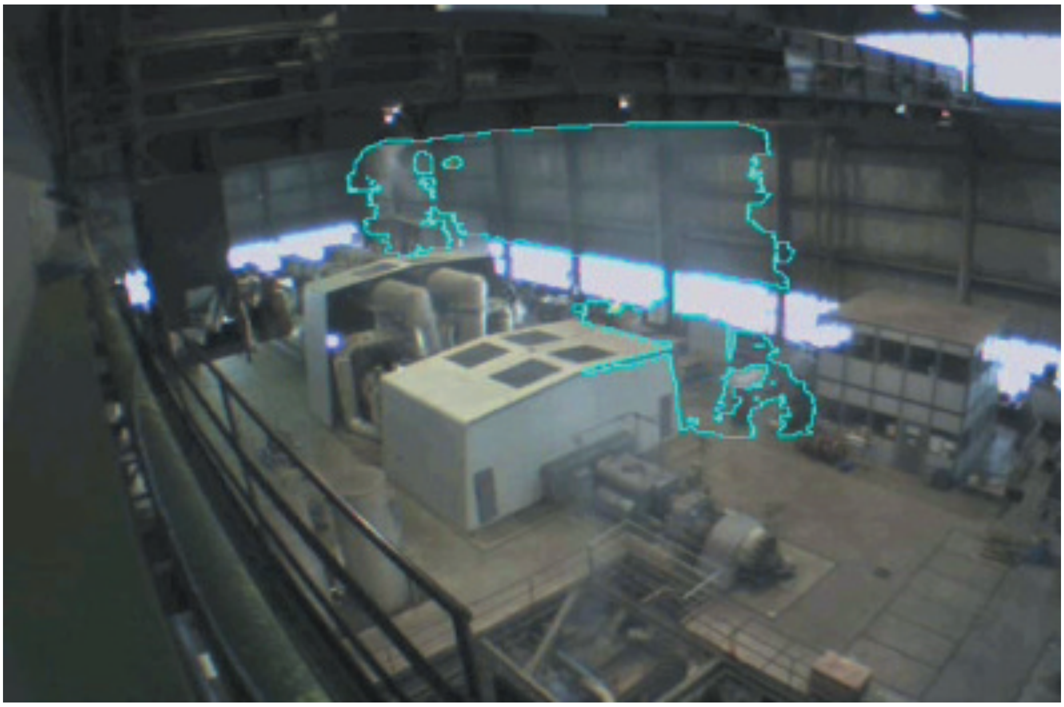


Mac Mottley

Fike Corporation

Video image smoke and flame detection has made great progress over the past ten years. Advances in Technology and experiences have led to the evolution of new applications and the use of video image detection (VID) as a mainstream fire detection solution.

Advances in imagers, processors and analytics have moved video image detection technology from an analogue prototype to a mass-produced, embedded IP enabled device – one that provides users with immediate situational awareness. Advances in codes, standards, and certifications have allowed fire protection professionals to confidently install the technology in areas where before there was no viable detection solution.

The first video image detection systems comprised black-and-white analogue cameras feeding into a digital video captive card in a standard personal computer. Early versions would only detect one type of event – either flame or smoke. The first prototype algorithms for flame detection could only run one channel on a DOS based X86 platform.

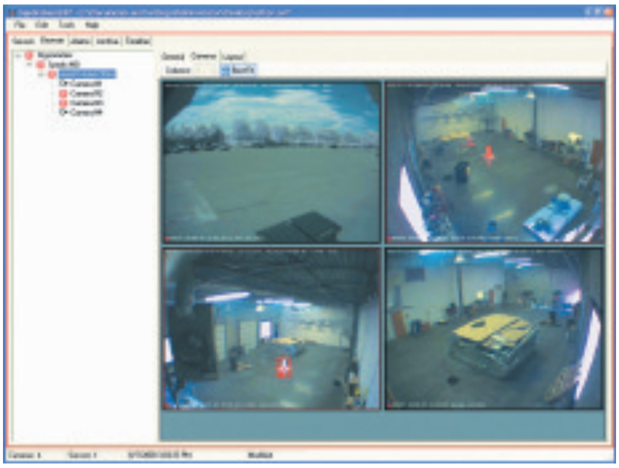
Over the past decade processors have evolved to the point where eight channels of video can be analysed on one server for flame, smoke and motion. State-of-the-art systems now have the algorithms embedded on the camera itself. And while older, server-based systems with analogue cameras could detect a three tenths of a meter pan fire at 30 meters with a 34 degree field-of-view lens, the most advanced IP (internet Protocol) VID cameras with digital signal processing (DSP) chipsets can detect the same size fire at the same distance with a wide angle lens, providing 2.5 to 3 times the coverage area. Alternatively, it can detect the same size fire at over twice the distance using a 34 degree lens. This huge performance increase is due to the DSP chip being able to stream four times the amount of pixel data for analysis by the detection algorithms.

In addition to the enhanced embedded detection capabilities, more advanced systems now offer all the functionality of an IP video network security system. Video is recorded 24/7 to the network video recorder (NVR) and all the alarm video, history and site plans, can be accessed through a remote monitoring software package. Not only can you see real time video of an alarm condition, there is a voice annunciation feature that calls out the exact cameras in alarm and the nature of the event. You can access cameras from anywhere in the world, as long as you have access to the internet.

There are also email packages available that can notify you anytime an alarm is generated, with a corresponding snapshot of the event, so you can maintain situational awareness through a smart phone. Clearly video image technology has come

echnology, Codes pdate

a long way, keeping pace not only with increased security needs, but with the growing dependence on wireless and real-time information.



Advances in codes, standards and approvals

VID technology was originally introduced for enhanced protection of high-value assets in large volume spaces as a voluntary supplemental system. End users were concerned that current fire protection/detection schemes did not go far enough to protect their property, contents, and potential business interruption. Though utilities and manufacturing facilities typically do not have a great number of casualties when there is a fire, the asset destruction and business interruption can result in tens of millions of dollars in damages. Many of these types of facilities have sprinkler systems, but by the time the fire is detected and contained, the result can still be devastating damage.

As the VID technology became more popular, end users started looking for guidance from the codes and standards agencies. One of the first published standards came out of the UK in the form of BS 5839-1:2002+A2:2008 (Code of Practice for System Design, Installation, Commissioning and Maintenance):

> **Section 21.1.3 Smoke Detectors**
> Smoke may also be detected by video techniques, in which closed circuit television cameras monitor the protected space; the signals from each camera are analysed electronically to detect the presence of smoke by the obscuration of part of the cameras field of view that it creates. Detection therefore relies on illumination of the field of view by normal lighting or specially installed infra-red light sources. Such systems are still in their infancy at the time of publication of this standard. They are used for special applications and require specialist design.

As supplemental installations continued to grow in the United States, the technology was approved as an initiating device in the 2007 edition of NFPA 72, the National Fire Code:

> **5.7.6 Video Image Smoke Detection**
> 5.7.6.1 Video image smoke detection systems and all of the components thereof, including hardware and software, shall be listed for the purpose of smoke detection.
> 5.7.6.2 Video image smoke detection systems shall comply with all of the applicable requirements of Chapters 1,4,5,6, and 10 of this Code.
> 5.7.6.2.1 Systems shall be designed in accordance with the performance-based design requirements of Section 5.3.
> 5.7.6.2.2 The location and spacing of video image smoke detectors shall comply with the requirements of 5.10.5.
> 5.7.6.3* Video signals generated by cameras that are components of video image smoke detection systems shall be permitted to be transmitted to other systems for other uses only through output connections provided specifically for that purpose by the video system manufacturer.
> 5.7.6.4* All components controls and software shall be protected from unauthorized changes. All changes to the software or component settings shall be tested in accordance with Chapter 10.

At the time only Factory Mutual approved video image detection systems by using modified ANSI 268 (smoke detection) and FM 3260 (optical flame detector) standards. NFPA 72 also required an uninterrupted power supply. For the server based systems of the time, this required a large number of batteries to meet the necessary 24-hours of power back-up required by NFPA. For the required communication integrity, systems had to monitor their camera feeds for interruption and ensure an alarm signal reached the monitoring point.

NFPA also required that these systems use a performance-based design and this will most likely remain so in the future, due to the wide range of performance, architecture, and lighting requirements. With the introduction of the technology into the NFPA code and FM's ability to approve systems, supplemental installations have continued to grow. Because of cost, privacy issues, and the technology's ability to cover large volume spaces, VID systems (both smoke only and fire and smoke) are generally best suited for non-residential applications such as power plants, warehouses, and manufacturing facilities.

Another application that has successfully used the VID technology has been in tunnels. For this reason, the 2008 edition of NFPA 502, Standard for Road Tunnels, Bridges, and Other Limited Access Highways added language to the code: 7.4.1.4.6 CCTV systems used for automatic fire detection systems shall be permitted when listed for the intended purpose and installed in

accordance with the manufacturer's requirements and NFPA 72.

Until this stage, UL had not listed any VID devices nor did a UL standard exist that VID systems could pass. One hurdle was UL 268, which has been used to test beam, spot and air aspiration systems, requiring detection within a predefined obscuration limit. The conventional technologies being tested relied on the smoke reaching the sensor, therefore an obscuration measurement had to be made at the location of the detector or sampling port to ensure detection within the bounding limits. Video "sees" the smoke – in many instances before it has reached the obscuration measuring point in the UL 268 room. In other words, tying the pass/fail criteria to a point measurement was inappropriate for the three-dimensional VID detectors.

UL has since created UL 268B for video smoke detection that uses the same test sources and room dimensions, but removes the criteria that ties obscuration to the detection, and instead uses a time to detection. FM, which has traditionally tested the systems to modified ANSI/UL 268 and FM 3260 test standards, has begun the process of creating a new video image detection standard (FM3232). This standard will better define the expectations of a VID detector and take into account the advances in the technology, as well as the knowledge gained by FM, manufacturers, and industry personnel.

With the introduction of the technology into the NFPA code and FM's ability to approve systems, supplemental installations have continued to grow.

Advances in VID applications

Most of the first VID applications were originally in industrial type facilities. These included power plants, industrial facilities, and defence contractors. In an early installation of the VID technology, Pratt & Whitney selected a SigniFire system to protect a machining area. Shortly after the system was set up an alarm went off, though the dispatcher could not see any smoke or indication on the screen. All he could see was a graphic "… which outlined where the smoke was in the room". Five officers were dispatched to check the situation and, sure enough, the camera had picked up traces of smoke from a separate room 30 metres away.

"That really made a believer of me," said Bruce Nedeau, manager of protective services for Pratt & Whitney. "It was 15 metres from the camera to the door and 15 metres more, around a corner, to where the smoke was." It was discovered that a machinist was cutting where he was not supposed to, generating smoke, which was picked up by the camera.

Dominion Energy, a company with 17,000 employees and 30 power plants was also an early adopter of the technology. Mark Boone, a corporate risk manager, also sat on the technical committee of NFPA 72, which was responsible for the language inserted into the 2007 edition of the National Fire Code regarding the inclusion of video image detection technology. At the Kincaid Generating station in Illinois, several cameras were placed into a large open turbine area, as well as a major coal handling area. "This was a site of high interest, because the coal is Powder River Basin Coal," Boone explained. "It's a type of coal that is more volatile – it has the propensity to self ignite."

After the technology was adopted into the code and certified by Factory Mutual and listed by UL, other types of applications started to surface, including for the use in cultural property protection. Because the cameras can be used for both security and fire detection, VID is an ideal solution for museums, libraries, historic buildings, national parks and monuments. Two recent projects to adopt the VID technology as part of their asset protection strategy include the National Academy of Sciences and the House of the Temple.

Educational institutions also require both security and early warning fire detection. The University of Arizona uses the technology in the Biosphere as well as other more "traditional" application areas such as within power plants and machine rooms. Duke University has also deployed the technology in multiple areas.

Fred Knipper, Director of the Fire & Safety Division for Duke, explained: "When I came on board as the new Director of the Fire Safety Division, I challenged my folks to put Duke on the map with leading-edge technology fire protection devices. Duke University and the Duke Health system are top institutions and have some of the most technologically advanced equipment. I felt it was a priority to protect these institutions, their employees, students, and visitors with the most advanced fire protection devices we could find." He continued: "As we began to explore the options, VID technology came to the top of the list. Duke University has a lot of facilities with wide open spaces that get used for a variety of purposes. Old technologies limited the use of these facilities in many cases. As we evaluated VID systems, we found that they would not only provide us the automatic fire protection the codes required, but would also increase our facility usage without having to impair our systems."

Fred Kipper added, "We found that in most applications we investigated, we saw a substantial saving versus the cost of future adjustments and replacement of older technology devices. The fact that it also 'records' incidents was yet another major benefit. Having this capability will aid in investigations of incidents by having documentation of any incident as it occurs!"

As the adoption of Video Image Detection continues to grow, the technology will continue to be implemented into more and more applications. VID now provides an early warning detection solution for large open areas where previously there was not a viable solution available to the fire protection professional. Not only does VID provide early warning detection, it provides instant situational awareness that leads to a quick suppression response, thereby reducing the chance of fire growth and subsequent damage. IFP

Mac Mottley is General Manager of Fike VID (Video Image Detection)

For further information, go to www.signifire.fike.com

Integrating Fire D Building Managem

OpenConnect Gateway from Apollo resolves the issue of fire detection integration

Eva Kosanovic

Apollo Fire Detectors

Buildings today can have any number of systems installed in order to control security, heating, lighting and ventilation. It is common practice, particularly in larger scale buildings, to combine these different elements into a single, integrated building management system. So what are the issues surrounding the integration of fire detection with other building management systems and what are the latest technological developments.

One essential building service has, to date, resisted full integration – fire detection. This situation is set to change with the evolution of a new device called OpenConnect Gateway, but to understand why this development is so significant in terms of integration it is essential to understand why fire detection systems have been kept separate from other building services in the past, and explore why integration is now so desirable.

To BMS or not to BMS?

Firstly, and perhaps most importantly, fire detection is deemed safety-critical. It could therefore be argued that fire detection should take precedence over other building services' systems and remain completely independent. For example, there may be some advantages to be gained by several systems sharing information – but is it worth the risk to life and property of a fault with, say, the heating system knocking out the fire detection system? In addition, if the fire detection system is kept separate, then the user cannot mistake the flashing light on the control panel for anything but a fire alert.

Generally, fire detection systems are subject to much stricter standards and controls than other building management services. The regulations governing the integration of fire detection systems are many and various and this can lead to some rather strange anomalies. For example, where a building management system (BMS) and a fire alarm system are channelled through a common information-gathering system, the cabling must be fireproof. However, a simple wire connection from the fire detection system to the BMS may fall outside this rule.

It is worth noting that there is no legislation as such on the topic of integration, only recommendations. BS 5839-1:2002, the code of practice for system design, installation, commissioning and maintenance in the UK, implies that the fire system should always stand alone. Full integration would therefore be at odds with this code. However, there is no law to insist that system designers stick to the code. Building regulations refer to, but

etection Into ent Systems

do not insist upon, compliance with the British Standard.

At the European level, there is a draft standard on integration, DD CIC/TS 50398:2009, which has been adopted by the UK and states: "the integrated alarm system shall be designed so that any application is not adversely affected by any other application in normal conditions."

It therefore takes a highly accomplished system designer and installation engineer to understand the application standards and work out which takes precedence where different systems meet.

Practical considerations

While regulations may appear to discourage fire system integration, in practical terms interaction between the different elements of a BMS are not only desirable, but also necessary if safety-critical procedures are to be effective. The ability for a fire signal to tell a security system to release certain access doors for use as escape routes is one simple example.

Indeed, some degree of fire detection integration has been satisfied already by the use of interfaces and complex bespoke integrations. These devices translate the signal from the fire system to another system and enable a fire alarm to trigger other pieces of plant and equipment. Actions can include opening and closing doors, shutting down air conditioning, or stopping passenger lifts safely at ground level.

Even interfaces with built-in isolators do not address the fundamental issue that multiple additional devices are required to facilitate even simple levels of integration between fire devices and other building services equipment. As commercial buildings become larger and more complex, and the expectations of occupants become more sophisticated, adding more and more physical devices to link building services together becomes less and less practical. It is therefore time to return to first principles and ask what it is we are actually trying to achieve.

Integration is all about communication. The benefits of having diverse building products and systems co-operating with each other are self-evident and include: faster response times; coordinated strategies in case of emergency or failure; and pre-planned and pre-programmed evacuation procedures.

There are some restrictions associated with the use of interfaces. When they were first introduced, standard interfaces needed separate isolating devices fitted on either side of them to prevent a short circuit disabling part of the fire detection system. Fitting three devices each time had a significant impact on project time and costs. Manufacturers subsequently developed interface units with built-in isolators to overcome this difficulty.

There are benefits to integrating fire signals with security, heat and other building systems

Finding a solution

When reduced to the basics, integration is actually all about communication. The benefits of having diverse building products and systems co-operating with each other are self-evident. Faster response times, coordinated strategies in case of emergency or failure, and pre-planned and pre-programmed evacuation procedures are among the most effective results of inter-system communication.

BMS is essentially an attempt to find a common translation for all these different languages so that lighting, heating, ventilation and other equipment can work in harmony. In other words, it shifts the emphasis from systems integration to information integration. When viewed from this perspective, assimilating fire detection into a BMS does not seem such as daunting prospect; nor does it compromise the issues surrounding the need for life-critical equipment to be physically separate.

Apollo has been working on a solution to fire system integration for some time. The result is a simple, off-the shelf product called OpenConnect Gateway. OpenConnect will take the information from a fire alarm control panel and connect it to a building management system using standard protocols such as BACnet, Modbus or LonWorks. The device is effectively a "plug and play" concept that fire panel manufacturers can incorporate into their existing products.

This integration solution has been developed in conjunction with Tridium and uses its well-established Niagra AX software framework, on which many building monitoring, automation and control applications are based. Apollo has also worked closely with leading fire panel manufacturers through its Panel Partnership and will continue to support the development and adoption of OpenConnect as it comes to market.

In line with the belief that collaboration and openness are the best basis for innovation, the OpenConnect protocol will be made available to participating control panel manufacturers under license. The licensed manufacturer will be able to develop its own software to incorporate this protocol and will provide a suitable physical connection between its panel and the OpenConnect Gateway. This allows sufficient freedom for the panel manufacturer to continue to offer its own unique design and features while incorporating the option for integration with BMS.

Installers benefit because there is no need for modification of fire detection and alarm devices used in conjunction with OpenConnect-enabled control panels. Nor is there any need for recurring engineering for each new project. End users will enjoy full integration of the fire system and reduced cost through the use of standard software and a single interface, while the integrity of the fire system remains assured.

The new integration device is being made available in four base model options: 200 BMS points, 1,600 BMS points, 12,000 BMS points and 25,000 BMS points. For maximum integration, each OpenConnect Gateway includes as standard two Ethernet ports, an RS232 and RS484 port, a 15V dc input and two spare comms card slots.

Conclusion

The precautionary approach adopted in current codes and regulations when giving guidance about integration is understandable but not legally binding and, in practice, system designers and specifiers have been moving towards greater integration for several years. Fire product manufacturers have also acknowledged the need for greater communication between fire and building service products through the development of interface units. However, the needs of the market continue to evolve and OpenConnect Gateway is one example of how the issue of integration can be resolved far more effectively using a single device than dozens of individual interfaces or bespoke solutions.

To summarise, fire detection systems evolved for the purpose of protecting lives and property. For this reason they should always be classed as safety-critical, which means that fire detection devices should be physically separate from other building services equipment. That said, there is no reason why closer information integration should not be pursued, especially if it brings practical benefits, such as reduced time and cost, without compromising the integrity of the fire system. IFP

Eva Kosanovic is at Apollo Fire Detectors Limited

For further information, go to www.apollo-fire.co.uk

Mission Critical As

Nick Grant

A few eyebrows might be raised when a company that has long argued the wisdom of in-cabinet fire detection and suppression expands its offering to include a full-room, total flooding solution. But mission-critical assets come in a variety of sizes and combining the two systems can be the most effective and cost efficient solution.

When the National Australia Bank (NAB) was hit recently by what the Wall Street Journal described, in a masterpiece of understatement, as a "computer glitch" the company came very close to melt-down. In addition to affecting millions of NAB customer across the country, the "glitch" impacted on transactions with just about every other bank. Accounts were erroneously frozen, wages and salaries went unpaid, customers were left without cash, and bank balances were thrown into chaos. The problem took six days to rectify, and how much it cost the bank – both financially and in damage to its reputation – is just about anyone's guess. Certainly, the bank is being very tight lipped.

At first glance, it may not be easy to spot the link between NAB's computer problem and fire detection and suppression. However, the story does throw into sharp focus the impact that even a small computer problem can have on a business that is totally reliant on its IT infrastructure. It also offers a chilling definition of the terms "mission-critical" and "business-critical". So picture a slightly different scenario: also a company that is dependant upon IT for its survival, but this time a business that is hit not by a "computer glitch" but a major fire. The result has the very real potential to make NAB's "glitch" appear to be a very trivial problem. Serious fire damage or the complete loss of such an organisation's IT assets could herald the collapse of the business.

"Provide dedicated fire protection for business-critical assets" has been Firetrace's mantra for many years, and it remains true as many are housed in cabinets and other enclosures where dedicated tube-based fire detection and suppression is the most efficient and cost-effective solution. However, as business becomes ever more complex and dependant upon technology, and as IT and communication innovations enable a growing number of business tasks to be computer controlled or computer generated, such technology demands more space and constant human interface. The space required expands beyond that

sets – Size Matters

capable of being housed in a cabinet or enclosure. In these cases, adopting a solution that floods the entire room may well be part of the solution. But the key word here is "part".

"Part of the solution" because, even in today's more-expansive computer suites there are still key assets that are housed in enclosures. So, it is not so much switching from in-cabinet protection to total flooding, as it is to adopting an integrated solution using both systems. Now, while that may appear to be an expensive option, the opposite may well be the case.

Protecting vital in-cabinet equipment with dedicated tube-based protection means that if a fire breaks out in that enclosed environment, it will be detected and suppressed right where it starts. Significantly, there will be no need for the remainder of the suite's total flooding system to be discharged. Typically, this means suppressing the fire with US$300 of suppression agent, compared with US$250,000. If, on the other hand, the fire breaks out in the main IT area, it will be suppressed by the total flooding system, without the in-cabinet systems being activated, again saving the unnecessary discharge of suppression agent.

Culturally critical assets

With the possible impact on business survival, the focus of attention is naturally on protecting IT and communications facilities. However, these are not the only critical assets that need safeguarding from fire; national treasures are every bit as important to society's heritage and culture.

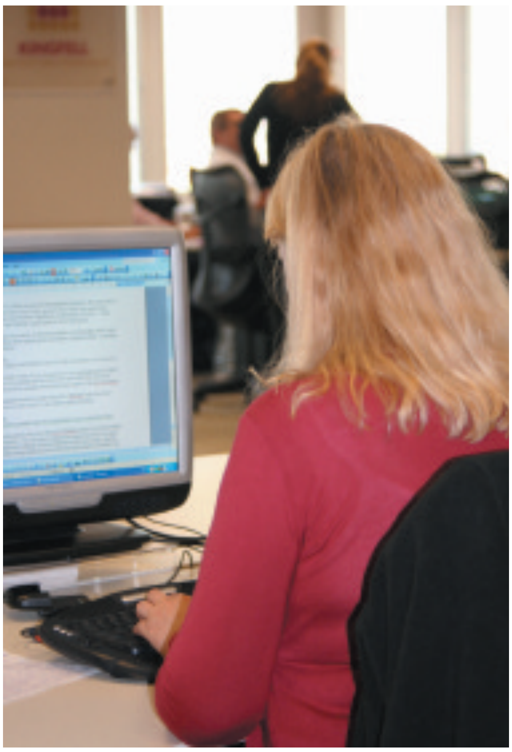
To cite just one example that puts the heritage fire challenge into sharp perspective, some 25,000 books were destroyed and a further 40,000 were damaged by smoke and water – no doubt used to suppress the fire – in a fire a few years ago in the Duchess Anna Amalia Library housed in a 16th-century rococo-style palace in Weimar, Germany. Christina Weiss, Germany's Culture Minister at the time, understandably called the fire "a national culture catastrophe and a great loss for world heritage."

Here too there is, of course, a strong argument for using both total flooding and in-cabinet protection. In fact, the argument may be even more compelling as certain artefacts or exhibits need to be housed within enclosures either for security or to safeguard them from the ambient atmosphere.

Suppression agent considerations

There are several factors that have to be taken into account when selecting a total flooding solution for business critical assets. These include five key considerations:

- The increasing desire to use clean suppression technology.
- The need for suppression to be fast acting to minimise damage.
- The importance of selecting a suppression agent that is not detrimental for room occupants.
- The importance of specifying a suppression agent that does not damage the very equipment it is there to protect.
- The desirability of choosing a suppression agent that makes the most efficient use of the available storage space.



In light of the demise of Halon 1301 and the disappointing performance of some agents that have entered the market since the signing of the Montreal Protocol, added to these five key factors are: the ability to be retrofitted to Halon systems; commercial availability of the suppression agent; and its long-term sustainability.

Significantly, the factors cited above that have to be taken into consideration when selecting a total flooding solution to protect a business-critical asset, apply equally to museums and art galleries. Perhaps the most important though is the need for the suppression agent not to damage the items it is there to protect. For, while computers are replaceable, ancient documents and works of art truly justify the term "irreplaceable".

Total flooding option

When developing the new UL [Underwriters Laboratories] listed Firetrace Total Flooding system it was decided that, while other suppression agents will be used to suit specific applications and fire safety needs, the system should be available initially with DuPont's FM-200, which has established itself as one of the most popular clean fire suppression agents. This is due to its ability to quickly knock down Class A (ordinary freely-burning combustible materials) Class B (flammable liquids and flammable gases – Classes B and C in Europe and Australasia/Asia) and Class C (electrical equipment – Class E in Europe and Australasia/Asia) fires with no risk of thermal shock damage to delicate equipment.

FM-200 is electrically non-conductive and non-corrosive; it leaves no oily residue or deposits to damage software, data files, communications equipment, documents or artefacts so clean-up operations are unnecessary following an agent discharge.

Another major consideration is the fact that, if discharged, the FM-200 gas does not itself pose any threat to human life. At its design concentration it does not deplete the oxygen level to a point where it is unsafe for occupants to remain in the room. Following discharge, the gas is dispersed through natural ventilation, a course of action made possible by FM-200's freedom from any toxic side effects and its zero ozone depletion characteristics.

In terms of space utilisation, FM-200 takes up little more space than a Halon 1301 installation, appreciably less that a CO_2 (Carbon Dioxide) system, and substantially less than an inert gas installation. This footprint is a particularly important consideration when office rental costs are taken into account. According to the Global Real Estate Market Annual Review produced by global property specialist, Knight Frank, a square metre of office space in London can more than US$1000 a year – a figure that is replicated in many of the world's major cities.

Firetrace Total Flooding clean agent systems can be activated either manually or automatically using electrical activation, and are available with cylinder capacities ranging from 7.26 kg to 544 kg that can be combined to create a fire suppression system that is appropriately sized for any room. Other cylinder capacity options are 32 kg, 68 kg, 113 kg, 170 kg, 254 kg, and 544 kg. Each of these cylinders can be under-filled in 0.45 kg increments to meet the exact amount of agent required within their fill ranges. Nozzles are available in various discharge patterns for pipe sizes ranging from 12.7 mm to 50.8 mm.

Synergistic solution

So, far from moving away from its oft-stated position that in-cabinet fire protection is the most logical method for protecting business-critical assets, the development of Firetrace Total Flooding technology merely acknowledges that in some instances more space needs to be devoted to housing assets. The rationale is simple; make the solution fit the size of the environment being protected.

At the same time, do not lose sight of the fact that, in many of these facilities, key assets are still enclosed in micro-environments, and they are best protected by their own dedicated fire detection and suppression systems. IFP

Nick Grant is EMEA Vice President and General Manager of Firetrace International

For more information, go to www.firetrace.com

When it comes to Complacency Kills

Graham Collins

There is never room for complacency when it comes to ensuring safe evacuation.

It is amazing how, in view of the heightened global risk of terrorism and the widely publicised deaths brought about by people's inability to escape from burning buildings, that there is not greater attention paid to building evacuation.

We all need to be more aware and take greater care. Designers need to work more closely with fire engineers from the earliest concept stage to establish how occupants will safely evacuate in a number of different emergency scenarios. Fire engineers need to utilise the best available fire modelling and evacuation modelling technology, and those responsible need to ensure that effective evacuation procedures are in place, are properly communicated, that staff are trained, and that the procedures are tested. Staff and visitors need to become more "evacuation aware" if lives are to be saved.

Public's reaction to fire

However frustrating it may be, the public's behaviour in a fire – even though it may, at times, be bizarre or irrational – has to be accommodated by engineers devising evacuation strategies. When automatic fire detection triggers an alarm, occupant's response is often anything but automatic. Time is often squandered in non-evacuation activities; a phase known as pre-movement time, during which occupants are trying to figure out what is happening and what, if anything, they should do.

Even when they do decide to evacuate, they may not make an immediate start. They first return to apartments, hotel rooms or offices to retrieve personal belongings and attempt to warn family and friends.

Critical time is lost. But why? The propensity of false alarms, a desire not to appear to be panicking, waiting to be told what to do, or simply having no idea of what to do are all commonly quoted reasons. In reality, the response time depends on many factors. Those with disabilities, the very young, the elderly and those under the influence of alcohol or drugs may well require more time and use different routes to those appropriate for able-bodied adults.

Research shows that people attempting to evacuate are prepared to move towards smoke. Frequently they will try to exit the building by the route they entered or via one of the routes that they habitually use, in some cases taking them towards danger rather than away from it.

Education is the key to making better informed decisions about a fire and to appreciate the importance of taking rapid and appropriate action. In some instances, this may be to remain where they are and await instructions. However, we are talking about training before the event, not during. And it has to be on-going and combined with regular fire drills.

Occupancy profile

Training is going to have its greatest impact on people that regularly occupy the building. It does though have an important secondary benefit, as trained staff are in a much better position to guide and assist – or "shepherd" – visitors out of the building.

Clear signage has an important part to play, but so does ensuring that visitors are made aware of

Evacuation,

the evacuation procedures. Voice alarm systems can play a major role in overcoming some of these obstacles, giving clear directions, zone by zone, on the appropriate course of action that should be taken. However, we live in a multi-cultural society, where the indigenous language is not everyone's native tongue.

Voice alarms can also contribute by informing occupants when not to evacuate. An example of this is following a terrorist explosion, when the safest course of action is possibly to remain in the building, rather than to mass-evacuate, exposing everyone to the danger of an explosive device targeted at the building's fleeing occupants.

Another major consideration is the evacuation of staff and visitors with disabilities. Two factors have to be considered: the ability of the disabled person to comprehend the alarm, and their ability to follow the same evacuation route and procedure as an able-bodied person. So, for example, voice alarms are unlikely to be of much use to a deaf person or an individual with severely impaired hearing. Similarly, an evacuation route that requires using stairs is completely inaccessible to a person in a wheelchair.

A co-ordinated approach throughout the building, particularly a high-rise building, is absolutely vital, more so if the building is multi-use or multi-occupancy. A major component in achieving this is the utilisation of the latest fire modelling and evacuation modelling software.

Advice and guidance

Certainly, there is no shortage of guidance when it comes to establishing evacuation strategies. In addition to the British Standard's Publically Available Specification PAS 911: 2007 (Fire strategies – guidance and framework for their formulation), BS 7974: 2001 (Application of Fire Safety Engineering Principles to the Design of Buildings – Code of Practice) has an entire sub-section devoted to evacuation. Similarly BS 8300:2009+A1:2010 (Design of Buildings and their Approaches to Meet the Needs of Disabled People – Code of Practice) includes useful guidance.

Another relevant Standard is BS 9999: 2008 [Code of practice for fire safety in the design, management and use of buildings]. This relatively new British Standard provides technical guidance on fire safety, setting out a more transparent and flexible approach to fire safety design by adopting a structured procedure for risk-based design. This will allow designers to take account of varying physical and human factors. Much of the guidance in BS 9999 is based on fire safety engineering principles, although it is not intended as a guide to fire safety engineering.

Evacuation modelling

Fire safety for a building's occupants relies on the RSET or Required Safe Egress Time being less than the ASET or Available Safe Egress Time. In other words, a solution where there is more time available to evacuate than is necessary to complete the evacuation. To determine these times it is essential to construct models of the building's fire and its evacuation, and to utilise both models in the CFE or Computational Fire Engineering process.

There are a number of evacuation modelling software packages available today. These include: Exit 89, an evacuation model designed to handle the evacuation of a large population of individuals from a high-rise building; Simulex, which uses SEAS or Synthetic Environments for Analysis and Simulation; Steps, which predicts pedestrian movement; and Exodus.

Exodus was developed at the University of Greenwich and can be applied to a number of different, complex scenarios including tower blocks, passenger-carrying aircraft, dome structures, ships, stadia and campus structures. It can be linked to the CFast and Smartfire fire modelling programmes, and enables the fire engineer to answer several questions: is there an evacuation problem; where is the problem; how can I understand it; and how can I solve it?

For example, an evacuation procedure might separate a building into a number of distinct fire safety areas, with phased procedures that incorporate first and second stage alerts via a voice alarm/public address system. These staged alerts could be linked to relay units that will operate vent plant and dampers.

There is an even greater number of fire modelling packages, with two main types: zone models, and field models that are also known as CFD or Computational Fluid Dynamics models. While CFD models take longer to set up and run, they are more suitable than zone models for buildings with complex geometry and the results are more accurate. One such model, called Smartfire, can be linked directly to the Exodus evacuation modelling software. It too is supported by the University of Greenwich.

Team effort

Before the catastrophic events on September 11, 2001, perceived wisdom was that evacuation from high-rise buildings should be phased. Sadly, we now live in a world where the risks are such that this is not always possible. In fact, even if phased evacuation is the most suitable strategy, can we rely on occupants of large structures to "await their turn" while they recall the horrific images of the collapsing World Trade Centre?

There is no doubt that we need to be constantly developing new evacuation strategies. But we also need to be working together more closely. Disaster chooses its own time and place and is no respecter of forgetfulness, lack of attention or lethargy, so complacency simply must not be tolerated – we may well only get one opportunity to get it right. IFP

Fire Stopping – Th Passive Fire Prote

Fire stopping can be perfectly capable when first installed, but subsequent changes to the building can alter its effectiveness

Sean Appleton

Promat UK Ltd

Passive fire protection measures have a long and proven history of helping to limit the effects of fire in buildings and fire stopping products play a central role in this effort. However fire stopping product must be specified and installed with considerable care.

The loss of life, property and possessions due to fire can always be relied upon to make headlines. However, recent estimates suggest that the number of businesses that suffer a fire, but never manage to fully recover from the effects, is as high as 40 percent. This illustrates perfectly that a blaze of any size can have less obvious, but equally devastating consequences.

The use of passive fire protection systems in buildings – and of the fire stopping products that lie at the heart of those systems – play a crucial role in limiting these consequences. Not only do they increase the time available for the building's occupants to escape, they also provide a bigger window of opportunity for firefighters to tackle the blaze. This can have a significant limiting effect on the amount of damage that the fire eventually creates.

Products such as fire barriers, batts, mastics, pipe collars, mortars and seals are central to this type of fire protection system. Pipes and services must often pass through floors, walls and ceilings and this can lead to problems if those floors walls and ceilings form part of the building's fire compartmentation system.

Once a fire has started it will seek out pipe and service openings and if they are not properly protected by fire stopping products, the fire will spread with ease into other parts of the building. If the building and its inhabitants are to be protected, the travel of the fire must be prevented at all costs.

Fire, heat and smoke

The term "fire stopping" can be somewhat misleading however. While preventing the spread of fire is, of course, absolutely critical, these products must also be able to protect against the dangers posed by the spread of both heat and smoke through the building.

A build-up of heat from a blaze can lead to spontaneous combustion on the opposite side of a fire compartmentation barrier. Thus, any fire stopping products must be able to stop that heat being transferred through the aperture they are protecting. This means that the heat insulation performance of a passive fire protection system (and of the fire-stopping products in that system) can be just as important as the actual fire resistance performance itself.

e Heart Of ction

Fire barriers, batts, mastics, pipe collars, mortars or seals are central to a typical fire protection system

Smoke is equally dangerous, if not more so. Smoke has the ability to travel at a typical rate of three metres a second, and although it is arguably less threatening to the building itself than the actual fire, smoke is often responsible for fatalities that occur during fires. Again, this means that fire stopping products must be as equally effective against the spread of smoke as they are against fire and heat.

Certified performance

It is clear then that, given the potential for the loss of life and property in a fire, fire stopping products must be of the highest quality and provide reliable levels of performance at all times. This is where the appropriate certification schemes play an important role.

There are a number of third-party product certification schemes in operation in different parts of the world, and their basic role is to assess whether or not the product in question provides the level of performance quoted by the manufacturer. This will be the same specification used for the original product fire test and will reassure the user that nothing has changed that might affect the performance of the product.

However, care must be exercised here, as the certification will often be application-specific. While this helps to make sure that the product is only used in a way that allows it to reproduce the fire stopping performance it displayed in the original fire test, it cannot be taken as an indicator that the product will perform just as well in situations that are similar, but not exactly the same. Many certification schemes also use a system of regular auditing to ensure that the product complies with current standards, as these are often subject to change over time.

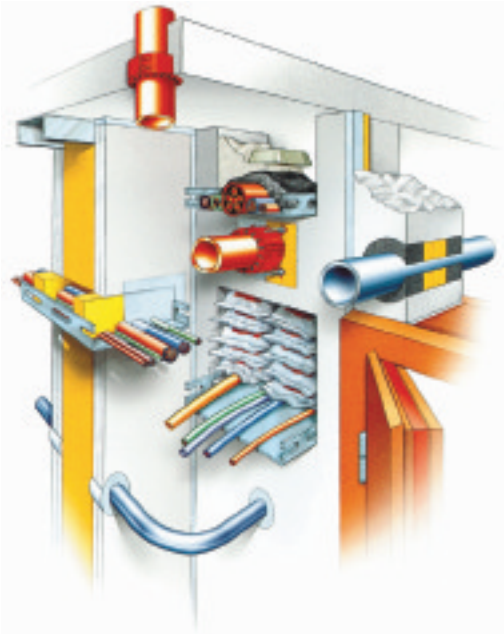
A typical example of a good source of reference for independent third- party product certification is the Exova Warrington Certifire approval scheme (http://www.warringtonfire.net/certifire). This website recommends products for different fire stopping and other passive fire protection applications and provides an excellent starting point for anyone specifying a fire stopping system.

Correct installation

No matter how good those fire stopping products themselves are though, they can only provide proper protection if they are installed appropriately. When faced with the last stages of making-good on a job, some contractors might routinely reach for a "fire rated" expanding foam to fill in any remaining gaps.

The product packaging can often state that this

No matter how good the fire stopping products are, they can only provide proper protection if installed appropriately



foam is able to achieve a four-hour fire rating and this might appear satisfactory for the application in question. The reality however can be quite different. The original product fire test might have been performed on a small gap in a thick, solid wall that has no services passing through it. This small hole limits the volume of oxygen that can reach the flames and so extends the time period for which the foam can resist the passage of fire to four hours. However If the contractor applies the same foam to a larger gap on a thinner wall, the foam can be burnt through in just a matter of minutes.

The contractor also has many other factors to consider. These include whether the substrate that the fire stopping product will be used on is covered by the certification. Whether or not the product has been tested around different types of services is another vital consideration, as are the minimum and maximum amounts of fire-stopping material that can be used, the diameters and types of plastic pipes it has been tested on, and whether or not the product can accommodate movement of the pipework or ducting caused by temperature changes and other factors.

The fire stopping product will also have an effect on the acoustic insulation performance of the floor or wall it is applied to and this must be considered by the contractor. Age is another important factor too. A fire can erupt at any time during the lifetime of the building and the passage of time might affect the performance of the fire stopping products. Only specific age testing will provide any reassurance that the products will go on providing the essential level of performance for the required time period. This perhaps goes some way to explaining why some estimates put the number of buildings that have inadequate fire stopping protection as high as 80 percent. It also illustrates how important it is for the contractor to be properly informed and qualified.

Only an experienced and properly informed contractor will be aware of all the considerations. Again, there are relevant certification standards, such as the Exova Warrington FIRAS scheme, that apply to installers and contractors and these usually prove to be a good guide to competence in this area.

Refurbishment work

It is important to remember though that it is not only the original installer that needs to be covered by relevant certification. It really should apply to any contractor who is subsequently involved in working on the building in question. A fire stopping system can be perfectly capable when first installed, but any subsequent change to any part of the building has the potential to alter its performance and the effectiveness of the installed fire stopping measures.

Throughout its lifetime a building might be subjected to many changes, from whole walls being added or removed through to smaller works such as new pipework being installed. Any of these can involve penetrating a section of a fire compartmentation system and creating new apertures in fire barriers. Unless fire stopping products are used to restore the integrity of the compartmentation system or the original firerating of the new apertures, the fire performance of the building will be compromised. Not only can this contravene the various types of building and fire regulations that apply in different territories, the consequences can be potentially lethal. A competent and certified contractor will be aware of this and will work accordingly, again using only the most appropriate materials.

Expert advice

Of course there are many sources that can be approached for guidance in specifying and installing a fire stopping system. These include such bodies as the UK's Association for Specialist Fire Protection (ASFP), which publishes a "Red Book" guide to Fire Stopping and Penetration Seals for the Construction Industry (www.asfp.org.uk). The ASFP, and similar bodies across the globe, are dedicated to protecting life and property and will offer sound advice to those who need it.

Similar guidance can also be found from the manufacturers of the fire stopping products themselves, especially those whose products are covered by credible certification schemes. Such a manufacturer is arguably best placed to advise which applications their products are best suited to and how they can be used most effectively.

There are also significant advantages to be gained by dealing with a manufacturer who can provide a wide range of suitable products. The fire stopping measures within a building are best thought of as an holistic, overall system and so it makes good sense to source all the components of that system from a single manufacturer. Not only does this simplify the system design and specification tasks, it also ensures that all the different parts of that system will be properly integrated with each other to create a more effective end result. The manufacturer is often also well-placed to advise on the increasingly complex rules and regulations that govern system design and installation.

From what we have seen then, specifying and installing the most appropriate fire stopping products can seem to be a daunting task. However a combination of care, research and a policy of dealing only with reputable suppliers and contractors is the best way to arrive at an efficient, effective and reliable solution. IFP

Sean Appleton is Marketing Manager at Promat UK Limited

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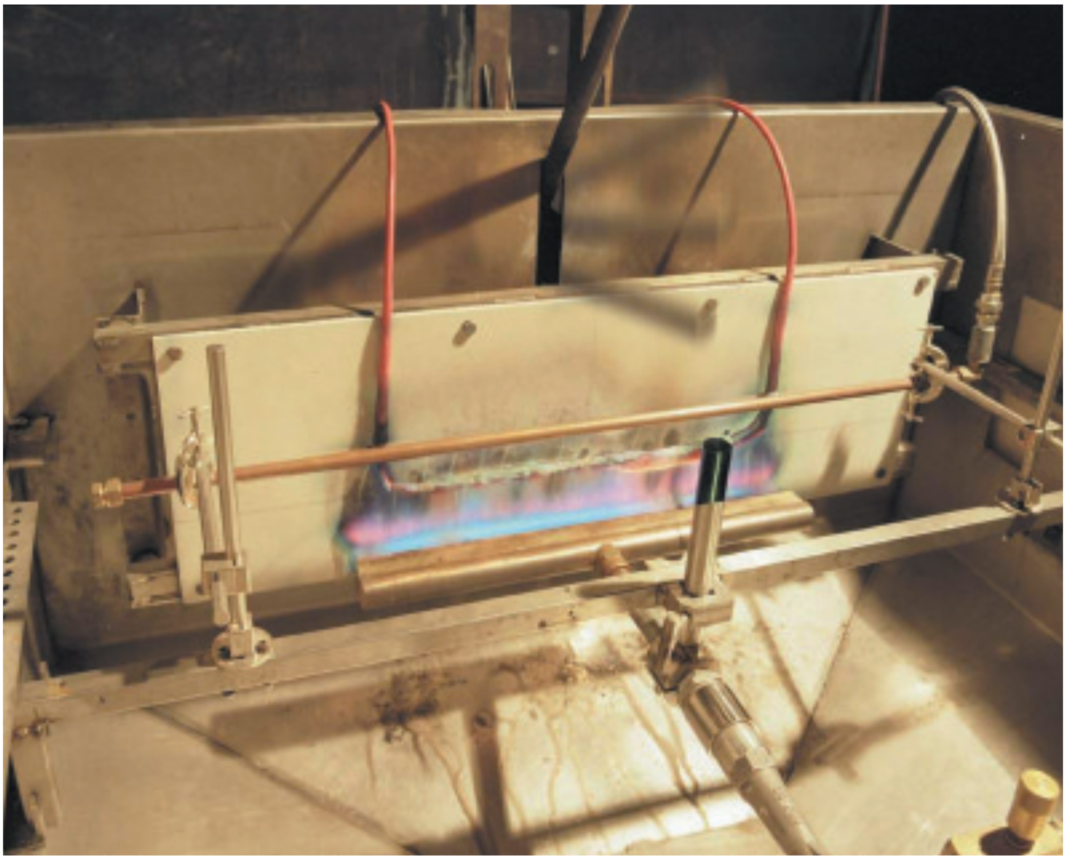


Mark Froggatt

If we continue ignoring or adopting distorted interpretations of the new British Standard Code of Practice on fire-resistant power and control cables, will it end in disaster?

Fire safety legislation has not been in short supply in recent years. And for everyone involved in the built environment it has been an exciting time. Today, city skylines have been transformed by the silhouette of structures that just a few years back would have been impossible to construct in the way envisaged by their architects.

Much of this change has been driven by a global switch from building codes and standards that, depending on your viewpoint, were either a straightjacket to architect's creativity or a set of prescribed regulations that ensured consistent fire safety. Whatever stance you favoured, under the old regime you knew where you stood and what – precisely – you could and could not do.

Many things changed the fire safety landscape. The coming of age of the science of fire engineering was undoubtedly one of the major, some would argue the most significant, driver without which this new design freedom would never have been realised. While the change was first noticed in the new cityscape buildings designed by avant-garde architects, fire safety engineered solutions have became commonplace across the globe. Inevitably, an environment where design constraints were removed inspired new thinking and spawned an entirely new style of architecture.

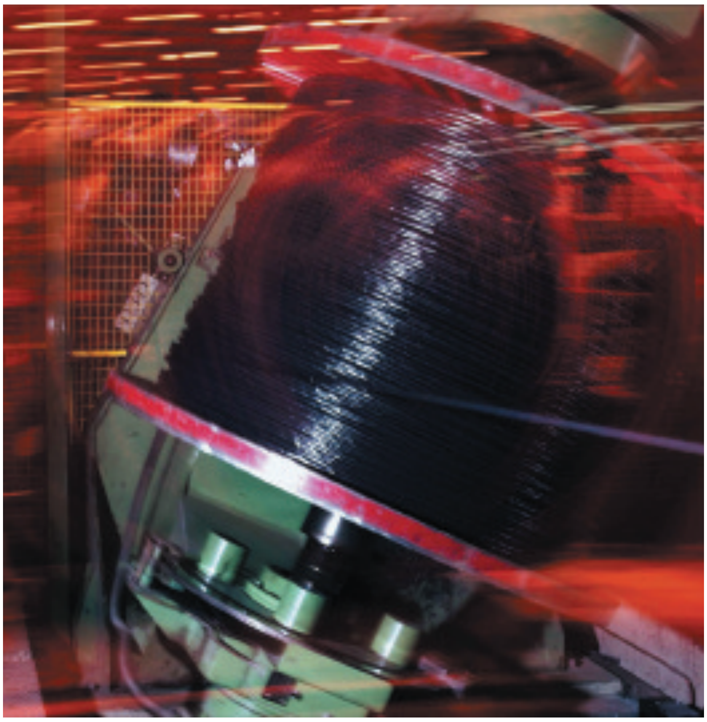
But, if fire engineering was the powerhouse of the new approach to fire safety, the changes heralded in by new legislation was the fuel and lubricant. This is probably best epitomised in the fundamental change in fire safety legislation that took place in the UK in 2006 with the enactment of the Regulatory Reform (Fire Safety) Order 2005. This took the responsibility for fire safety out of the hands of the professional fire and rescue service, and placed it firmly in the lap of building owners and managers. It heralded in the notion of a "responsible person".

At around the same time, amendments to the English and Welsh Building Regulations, particularly in the form of Approved Document B, took on board these changes and took account of the fire safety challenges posed when adopting a fire engineered solution.

Few architects, and fewer still fire engineers,

rossed Wires,
For Disaster

have judged these changes to be retrograde steps. But, and it is an important "but", this continues to be a challenging, and sometime misunderstood "brave new world". One of the inevitable consequences of the move away from prescriptive measures is that fire safety solutions are now potentially controversial and open to individual interpretation; there is also considerable scope for misinterpretation, with the very real prospect of life-threatening and property-threatening consequences.



What's large and complex – what's power, what's control?

A current example of this potential for disaster comes in the wake of the new BS 8519:2010 [*Selection and installation of fire-resistant power and control cable systems for life safety and fire-fighting applications. Code of Practice*]. This replaces BS 7346-6:2005 [*Components for smoke and heat control systems. Specifications for cable systems*]. Among other changes, it calls for power cables – that is defined as cables connecting a device to the power supply – to be tested in accordance with BS 8491:2008 [*Method for assessment of fire integrity of large diameter power cables for use as components for smoke and heat control systems and certain other active fire safety systems*] that itself replaced the test element of BS 7346-6: 2005.

The significant difference between the new BS 8519:2010 and the now withdrawn BS 7346-6 is an expansion of content to include all life safety and firefighting systems, and not just smoke venting and firefighting cores. BS 8519:2010 also includes new and revised technical guidance relating to the selection and installation of fire-resistant cables and systems for life safety and firefighting applications, and ensures that the level of circuit integrity is not compromised by other elements of the electrical distribution system, including cable glands, terminations, joints and cable support systems. It also makes reference to the recommendations in BS 9999:2008 [*Code of practice for fire safety in the design, management and use of buildings*] in relation to the design and installation of electrical distribution systems for life safety and fire-fighting equipment.

The new Code specifically applies only to "large and complex buildings" and its aim is to increase the protection of building occupants and firefighters. It refers expressly to fire resistant "power and control cables".

The quotes around "large and complex buildings" and "power and control cables" are mine, as these are the two areas that seem to be at the heart of the… let us call it "confusion".

An inevitable consequence of the move away from prescriptive measures is that fire safety solutions are now potentially controversial and open to individual interpretation; there is considerable scope for misinterpretation, with the very real prospect of life-threatening and property-threatening consequences.

Large and complex buildings

I will first deal with the "large and complex buildings" as it is clear that an important provision of Clause 5.38 of Volume Two (buildings other than dwelling houses) of Approved Document B (Fire safety) to the Building Regulations – Protected Power Circuits – is either misunderstood, intentionally not applied or not enforced in some parts of the country. For some inexplicably reason, this does not apply in the Greater London area where the requirements of Clause 5.38 are being enforced.

Keith Elves, Principal Engineer at Westminster District Surveyors in London believes that this is because there is insufficient effort being put behind highlighting the new requirements in BS 8519:2010, and because no training is being given to Building Control Officers working outside the main cities. He argues: "In general electrical contractors completing for contracts where these cables should be used do not even know the new Code exists." He continues: "Cables that pass only the old BS 6387 standard cable fire tests are still freely available to electrical contractors that have to tender for this type of work, and usually the contractor with the lowest tender wins the contract, resulting in non-approved fire cables being used."

Clause 5.38 clearly states: "In large or complex buildings there may be fire protection systems that need to operate for an extended period during a fire. Further guidance on the selection of cable for such systems is given in BS 5839-1, BS 5266-1, and BS 7346-6." However, cables are still regularly being specified and installed for these safety-critical installations that do not comply with the stringent requirements of BS 7346-6 (now superseded by BS 8519:2010).

So, the challenge may be that the term "large and complex" building is too vague. Even so, surely it is reasonable to assert that it must embrace: all multi-use or multi-function buildings; high-rise office buildings, apartment blocks and hotels; buildings with complicated or lengthy evacuation protocols such as hospitals, shopping malls and leisure complexes; and all high-hazard structures? Reasonably, it should also include buildings where life safety is dependant upon the reliable operation of active fire precautions or electrically-operated passive measures including those with sophisticated fire detection and alarm systems; smoke venting systems; electrically-operated fire doors and smoke curtains; firefighting lifts; pressurisation and depressurisation fans; motor-driven smoke control dampers; and pumps for sprinkler systems and wet-risers.

One thing that is certain is that failure to meet the requirements of Approved Document B certainly cannot be because compliant cable is not widely available. Other than costly mineral insulated cables, there are two cables currently on the market that can claim to satisfy the requirements of Clause 5.38 and that are, additionally, third-party accredited. One of these is Draka's FTP120 – until recently called Firetuf Powerplus – a SWA [Steel Wire Armoured] power cable that achieves BS 8491's highest 120-minute rating.

When is a control cable a power cable?

Richard Sykes, Draka UK's Technical Manager, answers that question with an unequivocal "never", although a number of misleading claims are being made for some cables, with the confusion appearing to have arisen from a misinterpretation of the different test methods required for power cables and control cables.

He says: "BS 8519:2010 makes clear reference to three categories of circuit that are required to maintain their integrity under defined fire conditions for fire survival times of 30 minutes, 60 minutes and 120 minutes. Appropriate cable tests are identified for each category, giving the relevant British Standard for the assessment of cable performance under fire conditions that might be expected in an actual incident."

Cables are being promoted as complying with the new BS8519 Code and as being suitable for power applications that have not been ratified in accordance with the relevant test Standard, in this case BS 8491. These cables have been tested to a different standard, and so are suitable only as control cables, and not as power cables.

He continues: "However, cables are being promoted as complying with the new BS 8519:2010 and as being suitable for power applications that have not been ratified in accordance with the relevant test method stated in the Code, namely BS 8491:2008. These cables have been tested in accordance with BS EN 50200:2006 [*Method of test for resistance to fire of unprotected small cables for use in emergency circuits*] and so are suitable only as control cables, and not as power cables. Again. Draka's FTP120 is one of just two cables that fully comply with the power cable requirements of BS 8519:2010."

As a Code of Practice, the aim of BS 8519:2010 is to encourage best practice and takes the form of guidance and recommendations. However, fire engineers and installation contractors should take great care to ensure that cable manufacturer's or cable distributor's claims of power-cable compliance are not misleading. It is well worth remembering that any company claiming compliance with a Code of Practice is, reasonably, expected to be able to justify any actions that deviate from the Code's recommendations.

The design freedom that architects now enjoy in the new fire safety environment comes at a cost, and that cost is diligence. Our duty is clear – we must all strive to ensure that fire safety is never compromised by failing to comply rigorously with the appropriate cable standards and codes. IFP

Mark Froggatt is Marketing Services Manager at Draka UK

For further information, go to www.drakauk.com

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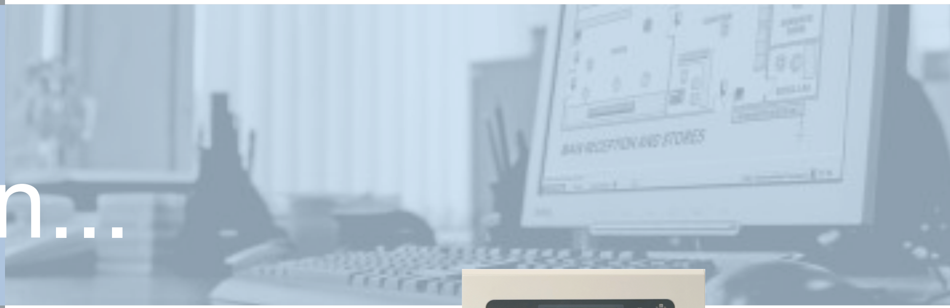

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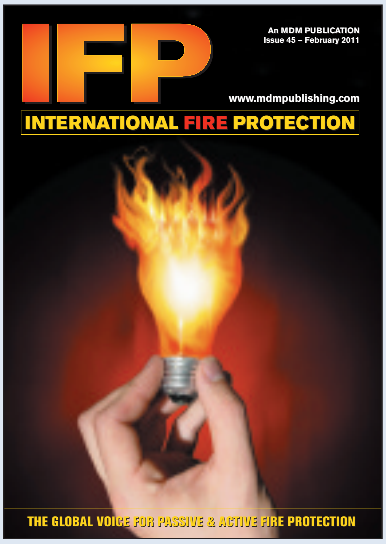

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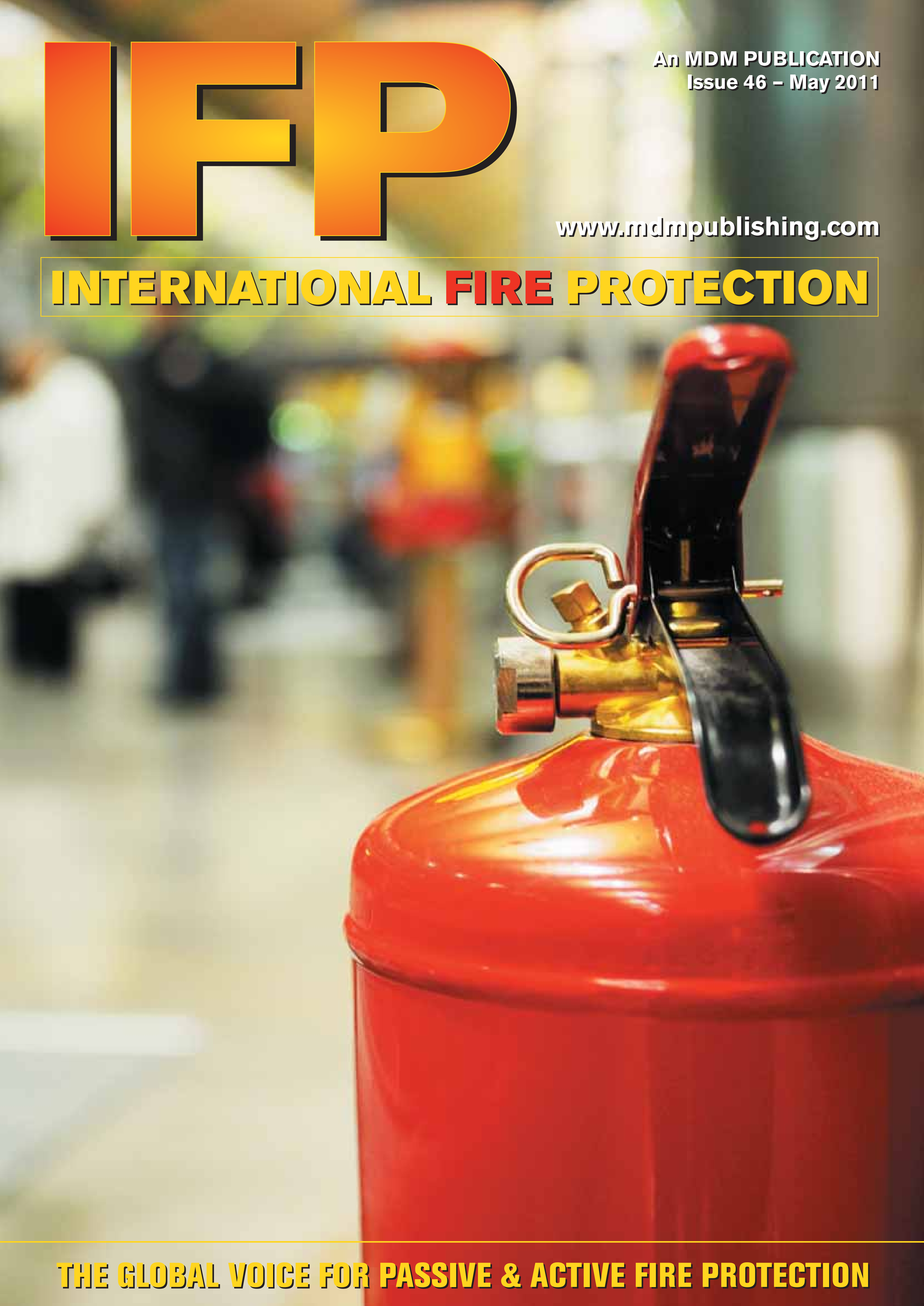

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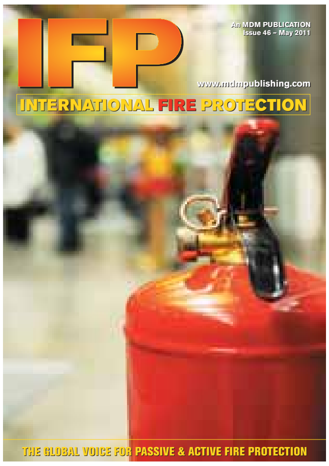

Front cover picture: close up of fire extinguisher in public transportation building ©iStockphoto.com/ifpmag

Publishers
Mark Seton & David Staddon

Group Editor
Graham Collins

Editorial Contributors
James Blue, Sarah Brewer, Graham Collins, Simon Ellison, Kaitlyn Greene, Horst Köhler, Peter Massingberd-Mundy, Keith Minster, Vuolle Pasi, Brian Quick, Charles Q. Su, Simon Whittall

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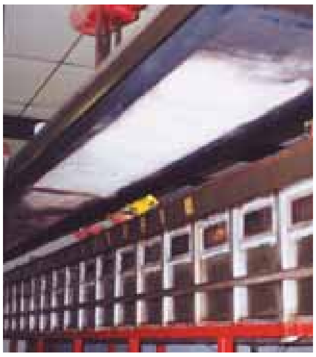
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There's Always Something to Learn

Graham Collins

If the recent spate of natural disasters around the world has shown us anything, it has clearly demonstrated that these catastrophic events choose their own time and place – they answer to nobody. The same can be said for fires; we simply do not know where and when a fire will break out.

Which should be a sobering reminder to us all that while fire protection is the way each of us, in one way or another, earns a living, getting it right each and every time can be the difference between life or death for the general public that daily puts its faith in us. In fire safety, there is no such thing as a minor or unimportant project.

Of course, getting it right should not be the aim of just manufacturers and installers; it applies equally to architects, fire engineers, building control officers, project managers and end users. This is why it is so important that all of us ensure that we keep ourselves up to date with the latest technology and new solutions in which manufacturers continue to invest huge sums of money and thousands of man hours.

Perhaps this is the reason that sometimes it is so disappointing how few of some of these groups seem to be willing to spare the time to attend fire exhibitions. It may be a rather simplistic analogy but if I want to discuss my health with a doctor I would not choose one who did not ensure that he was aware of current medical thinking. So, is it not reasonable that we expect those responsible for specifying and overseeing the installation of fire detection and alarm and fire suppression systems to know all about the latest developments?

A colleague in the fire industry once said to me that, if you perch yourself on the edge of your stand at an exhibition, you will see all of the people you have ever worked with walk by. The implication was that, all too often, exhibitions are the trade talking to the trade. I sincerely hope that this is proved wrong at both Firex and NFPA. Both should be on everybody's "must attend" list. Once again, MDM will be at Firex and NFPA, so we look forward to meeting you at one or other of the events.

On the subject of keeping abreast of new technology, this edition of International Fire Protection includes a number of articles on new technology – both active and passive fire protection. We have also taken a close look at applications in three specific market sectors: public buildings; tunnels; and utility buildings, and again our coverage of passive fire protection has increased with articles on fire stopping and fire-resistant glazing.

You may also have noticed recently that we have a completely new website that covers all three MDM publications – International Fire Protection; International Fire Fighter; and Asia Pacific Fire.

We genuinely believe that it sets a new global standard for publication websites in the fire safety industry. It is straightforward to navigate, access to the current and archived editions of each magazine is quick and easy, and it is updated frequently with firefighting and fire protection digest news from across the world. The features calendars for all three publications are easy to access and, to return to the subject of exhibitions, there is a calendar of forthcoming industry events around the world. IFP

New Compact Nitrogen System Inhibits Corrosion

SOUTH-TEK SYSTEMS has recently launched MICBlast, a compact system that generates and introduces high purity, corrosion inhibiting nitrogen into dry and pre-action fire protection systems.

MIC stands for microbiologically influenced corrosion and MIC, along with galvanic corrosion is reckoned to be one of the most widespread threats to the integrity of fire protection systems. Traditionally, compressed air is used to maintain supervisory pressure in a fire protection system. However, the moisture in the compressed air, as well as residual water trapped in the system's piping arrangement during hydrostatic testing, supports the cathodic oxygen reaction resulting in oxidation or corrosion of the steel and galvanised piping. This corrosion not only causes detrimental and costly leaks in the fire protection system; the remaining debris can also clog sprinkler heads

rendering them ineffective in the event of a fire.

The South-Tec Systems' solution is designed to inhibit corrosion by supplying dry, low- pressure, supervisory nitrogen, which is an inert, non-flammable gas. MICBlast is also equipped with a patented leak detection system that alarms when the nitrogen generator is operating more frequently than normal, due to a sizable leak in the piping system downstream. This feature protects the MICBlast from running unnecessarily, so maximising the life of the system and forewarning the building management that a significant leak requiring attention is developing within their piping system.

Installation of the system is said to be simple and can fit easily into new building designs, or can be integrated into an existing fire protection system. It operates quietly and requires minimal space, so it can be installed in smaller areas, such as inside a building's equipment room.

For additional information, contact: www.southteksystems.com

Berlin High-rise Watermist Solution

The 32-story Zoofenster – being built near the famous Tiergarten in Berlin – will be the tallest building in western Berlin and will be protected throughout by a MARIOFF Hi-fog water mist fire protection system. It houses luxury suites, office space and a 5-star luxury hotel with conference facilities.

The original plans for Zoofenster included a conventional sprinkler system, but the Marioff water mist solution was introduced as an alternative after construction had already started. Marioff claims that its superior cooling capacity and radiant heat blocking ensure safer working conditions for firefighters and safer evacuation for residents by suppressing and controlling the fire efficiently.

Fire tests were conducted on site in a replica of the lobby. Commenting on the test, Niklot von Bülow, the head contractor's Project Manager said: "I found the immediate impact on room temperature very positive. You just have the feeling you are in this cool fog and not near a fire." "It is very rare that you get to experience a fire first-hand like this", added Dirk-Herbert Rasch, Managing Director at Ingenieurgesellschaft Grabe mbH., technical consultants for the project.

For additional information, contact: www.marioff.com

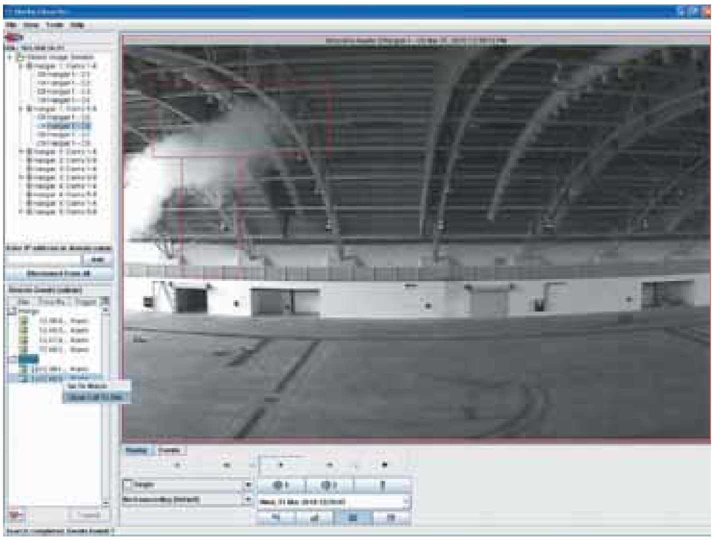
Basement Life Saver

A new product from BILCO, the ScapeWEL window well system, is said to offer a visually-appealing solution for buildings where below-ground areas are used for purposes other than storage. In the event of a fire it provides a potentially vital terraced-step-design secondary escape route for basement occupants, doing away with the need for them to egress via the upper floors of the building. It is also an alternative access point for firefighters, as the windows are large enough to allow a fully-equipped firefighter with an oxygen tank to enter the building.

The window well system is claimed to be easy to install and maintenance free. It is suitable both for new construction and refurbishment projects

For additional information, contact: www.bilcouk.com

Flying High at Riyadh Airport



Networkable CCTV-based video smoke detection systems have been supplied and commissioned in five large hangars at the Royal Maintenance complex at King Khalid International Airport, 35 kilometres north of Riyadh, Saudi Arabia.

The solution, supplied by D-TEC, consists of eight cameras carefully positioned around each hangar with these in turn connected to two, four-channel FireVu systems, giving a total of 40 cameras and 10 FireVu units across the project.

The D-Tec solution apparently came into the picture at a relatively late stage as, initially, linear heat detection had been specified in the open roof void of the new hangars as the primary means of fire detection. However, this decision was changed in preference to the FireVu VSD system solution because, D-Tec says, of its faster and potentially more reliable detection.

Other reasons cited for the decision to discard linear heat detection and ultimately move to video smoke detections were installation savings of around 35% when compared with the original solution, when all the installation and fixing of linear cables is included in the comparison. Crucially, by using the CCTV cameras specified for the project, and being able to link-in to the IT network, the VSD solution did not require extensive additional works or cabling. Speed of response was also given as a deciding factor – an important consideration in voluminous aircraft hangars. D-Tec says that the time-to-detection of smoke at source that FireVu offers is the same, whether the camera is ten or 100 metres away.

The commissioning and testing of the FireVu systems took place over a four-day period to ensure that the camera views in each hangar were optimised for the Video Smoke Detection's operation – leaving no critical gaps in coverage.

For additional information, contact: www.dtec-fire.com

Focus on EN54 Compliance

Now that the EN54 series of fire safety standards has transitioned into European law, TOA CORPORATION has announced that the most recent selection of its products to have been given EN 54-24 loudspeaker system certification is the VX-2000 Voice Evacuation System.

Claiming itself to be the first manufacturer to offer a total solution for EN54-certified voice evacuation systems, the audio specialist has confirmed that its PC-2369EN ceiling speaker, along with horn and box speakers BS-678BSB, BS-678BSW, CS-64BS, CS-154BS and SC-615BS as well as the PC-1867FC ceiling speaker and BS-680FC steel cabinet speaker have all been given EN54-24 approval.

For additional information, contact: www.toa.co.uk

New Flame Detector Added to Range

The latest addition to the MSA's FlameGard Series, the FlameGard 5 flame detector family, has been launched. The FlameGard 5 MSIR detector is a multi-spectral infrared detector that features what MSA describes as "breakthrough neural network intelligence for reliable discrimination between actual flames and nuisance false alarm sources".

Other members of the FlameGard 5 flame detector family include the FlameGard 5 UV/IR detector and the FlameGard 5 UV/IR-hydrogen detector, both of which use ultraviolet and infrared detection technology to provide high immunity to false alarms. The FlameGard 5 test lamp for testing the FlameGard 5 detectors is the final component in the new series.

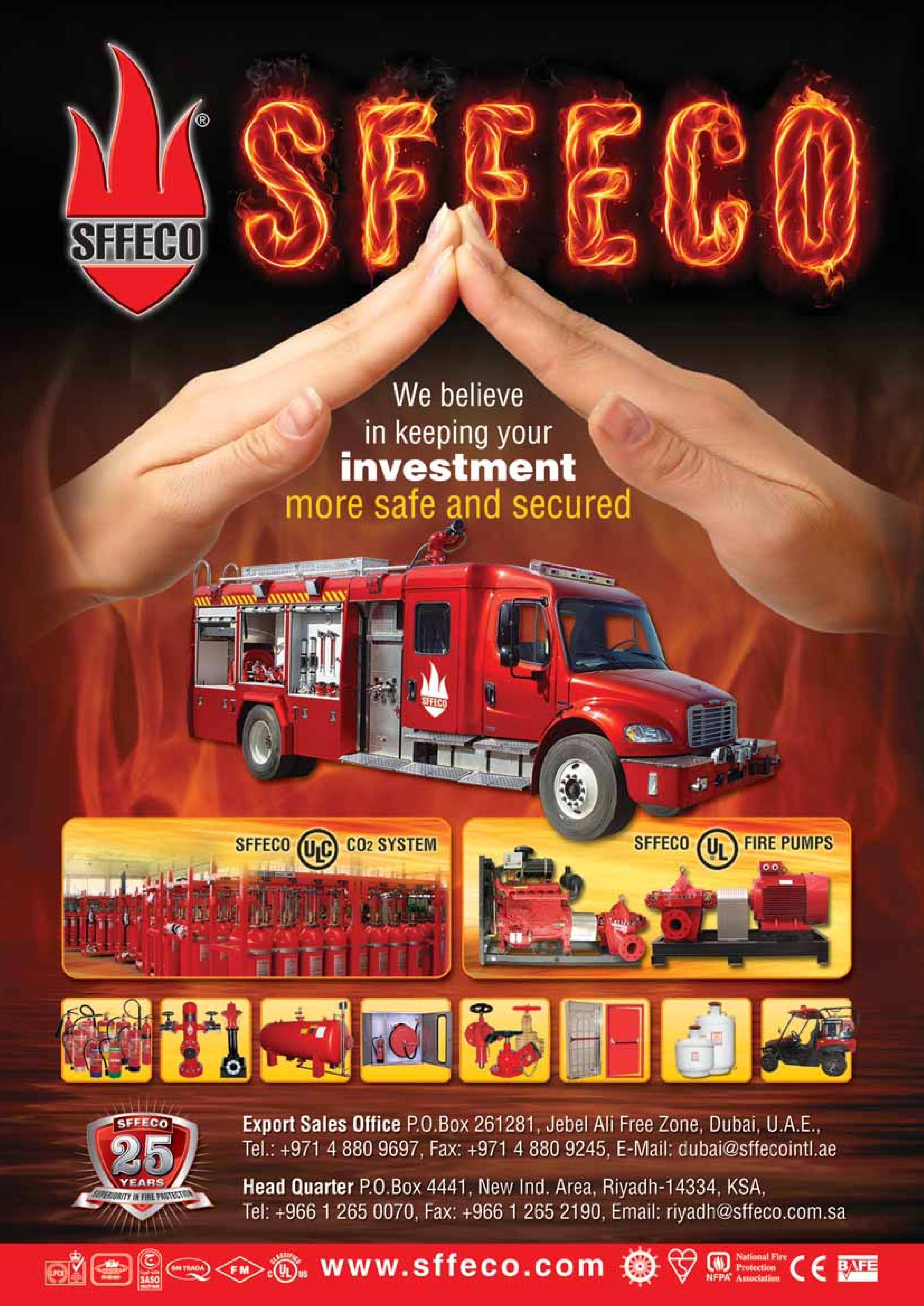
For additional information, contact: www.msanet.com

EN Approval for Fire-stop

In May 2010, the European Standard EN 1366-3 for fireproof cable and pipe penetrations in walls and floors came into effect.

However, until now there has not been a solution on the market that complied with the Standard and had the necessary approval. This situation has, according to Austrian fire-stop and sealing company, BST BRANDSCHUTZTECHNIK DÖPFL GMBH, been rectified by its obtaining the first ETA (European Technical Approval) for its latest development in structural fire protection – its Type AK-2.50 mixed penetration seal. The approval is the culmination of five years' work.

For additional information, contact: www.bst-firestop.com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NFPA Conference

NFPA Conference and Expo, this year's largest and most comprehensive event for the fire protection, life safety, and electrical industries, takes place from 12th to 15th June at the Boston Convention and Exhibition Centre, Massachusetts, USA, bringing together National Fire Protection Association experts and industry professionals for an unrivalled educational conference and an exhibition of more than 300 solution providers.

Kaitlyn Greene

National Fire Protection Association

Thousands of the top fire, electrical and building safety professionals from around the world consider attendance at the NFPA Conference & Expo a must. What do they know that keeps them coming back? They know there is no better place to be when looking for ways to do a better job, update knowledge, solve a problem, save money, make more money, or keep up with their competition. Whatever their reasons may be, you are sure to find plenty of great reasons of your own to attend. Here are just a few.

- Get information you can use immediately on the job.
- Learn directly from the leading authorities.
- Gain up-to-date knowledge on current industry topics.
- Select sessions for your specific needs.
- Earn valuable continuing education credits.
- Extend your training opportunities.
- Make your voice heard.
- Network with your peers.
- Meet more than 300 top solution providers at the Expo.
- Advance your career faster.

The conference

The NFPA Conference is a rich program and a powerful draw with real-world case studies, code updates, fire system design, technology updates, and industry research results and analysis. This year's conference offers 130 educational sessions, divided into 12 convenient tracks.

- Building & Life Safety – Technologies, best practices and statistical data needed by designers, engineers, and building and fire officials responsible for plans review, inspections, and other building-related tasks.
- Codes & Standards – Expert guidance on the practical application of NFPA codes and standards, as well as information on recent updates and changes.
- Detection & Notification – Code requirements and design issues affecting the application of new technologies in alarm and signalling systems, and the impact of maintenance on system performance.
- Electrical – Best practices in the electrical industry and how they are influenced by electrical design issues, successful maintenance programs, effective inspection techniques and safety programs.
- Emergency Preparedness/Business Continuity – The latest methodologies for accurately assessing risks and consequences, emergency preparedness, contingency planning and incident management and recovery capabilities.
- Fire & Emergency Services – A look at what is new in firefighting technology, safety, and preparedness for first responders, incident command strategies, and fire prevention and inspection techniques.

& Expo

- **Fire Protection Engineering** – Sponsored by SFPE. Ideas for meeting fire protection challenges using computer modelling, field testing, post-incident analyses, and other methods for developing performance-based building solutions.
- **Fire Suppression** – The importance of proper design, installation, inspection, testing, maintenance, and plans review on sprinkler system effectiveness.
- **Green** – How environmentally friendly initiatives affect the design, maintenance, and testing of fire and life safety systems and components.
- **Loss Control/Prevention** – Strategies for mitigating risk through accurate assessment of occupancy and commodity classification, enhanced reliability of fire protection systems, and other risk factors.
- **Public Education** – New planning strategies and creative solutions for meeting the challenges of effective public fire and life safety education.
- **Research** – The latest research into critical fire and life safety initiatives, including the reliability of emerging technologies.

Pre/Post-conference seminars

Arrive early or extend your stay to attend any of the 25 seminars and gain up-to-date knowledge of codes and standards that relate to you. One, two and three-day seminars are offered 10th, 11th, 12th and 16th June.

3-Day Seminars – Friday to Sunday

- New NFPA 70E Electrical Safety in the Workplace Certificate Program.
- NFPA 13, Installation of Sprinkler Systems.
- NFPA 72, National Fire Alarm & Signalling Code.
- NFPA 101, Life Safety Code Essentials.

2-Day Seminars – Friday & Saturday

- Life Safety Code for Health Care Occupancies.
- CFPS Primer.
- Code Requirements for Maintaining Fire & Life Safety Systems.
- NFPA 1600, Disaster/Emergency Management & Business Continuity Programs.
- NFPA 1, Fire Code.
- Sprinkler Hydraulics.
- NFPA 921, Guide for Fire & Explosion Investigations.
- Seminario NFPA 25 (presentado en español).

1-Day Seminars – Friday, 10th June

- NFPA 70E Changes.
- Emergency & Standby Power.
- Explosion Prevention & Protection.
- Sprinkler Plans Review.

1-Day Seminars – Saturday, 11th June

- Dust Explosion Hazards.
- Hazardous (Classified) Locations.
- Fire Protection Concepts & Analysis for Property Loss Prevention.
- SFPE's Overview of Smoke Management Systems.
- National Electrical Code for Photovoltaics.

1-Day Seminars – Thursday, 16th June.

- NFPA 99, Health Care Facilities Update.
- NFPA 3, Recommended Practice on Commissioning & Integrated Testing of Fire Protection & Life Safety Systems.
- NFPA 101, Life Safety Code Changes.
- Fire Alarm Interfaces.

The Expo, Technical Meeting and More

Opening on 12th June, the Expo will showcase the latest products and services from more than 300 of the top solution providers in the fire protection, life safety, and electrical industries. Knowledgeable representatives from these companies will be available to answer your questions and offer solutions to your most pressing challenges. The Expo provides you with the ideal location to see, touch, and try products, as well as meet with a company's technical staff.

Make connections and learn from your peers. Leverage unparalleled networking by connecting with your peers through the NFPA blog (nfpa.typepad.com/conference; in Spanish, nfpa.typepad.com/conferencia), Twitter (follow @NFPA), and Facebook (facebook.com/theNFPA and facebook.com/NFPAconf).

In preparation for the show, add the NFPA Conference & Expo mobile app to your phone (available 30 days before the show) and create a customised schedule: search and add conference sessions and exhibits that you would like to attend, then access your customised list during the show. Virtually all smart-phone users have free access to the application. To download, search "NFPA C&E" on iTunes App Store, Android Market, or Blackberry App World. If you are on any other mobile phone, you can download the application directly from your mobile browser by going to nfpa.boopsie.com.

The Association Technical Meeting will be held on Tuesday, 14th June, and Wednesday, 15th June. More than 30 standards are in the annual 2011 revision cycle and could receive a Notice of Intent to Make a Motion (NITMAM) for the June 2011 Association Technical Meeting or be considered consent standards before the meeting.

These standards cover fire codes, flammable and combustible liquids, health care facility safety, building and construction safety, and electrical safety, and more could be voted on during the Association Technical Meeting sessions. In early May, the completed Motions Committee Report on Annual 2011 revision cycle standards will be posted on the NFPA.org. The Consolidated Motions Committee Report will contain both autumn 2010 revision cycle standards and annual 2011 revision cycle standards that have received Certified Amending Motions.

Book your travel and hotel now

Special hotel and travel rates are available for a limited time. Reservations can be made through the official housing partner ONPeak at nfpa.org/conference or by calling toll-free (U.S.) 1-888-472-4597 or 1-312-527-7300.

Register at nfpa.org/conference

Register to attend today. NFPA members and Technical Committee members enjoy significant discounts. IFP

Kaitlyn Greene is Associate Project Manager, Marketing & Sales at the National Fire Protection Association

For further information, go to www.nfpa.org/conference

Hospital Redevelopment Fire Detection

Fire safety at the new Royal London Hospital – Britain's biggest new hospital and home to a range of specialist centres, including London's leading trauma and emergency care centre and one of the UK's major children's hospitals – has been entrusted to APOLLO fire detection technology. Work is ongoing, and already more than 7,500 Apollo devices have been installed.

Meeting the hospital's highly complex set of fire protection and evacuation requirements was the responsibility of Static Systems Group, which was awarded the contract for the design, supply, installation and commissioning of the system, which is designed around Static Systems' Series 900 panel. 37 fire alarm panels have been provided in total, with each panel controlling approximately 20 fire alarm zones. Main control of the fire alarm network is from the Fire Command Centre, which has also been supplied with a sprinkler data gathering unit.

Approximately 5,000 Apollo Discovery Multi-sensors and 2,500 XP95 mains switching input/output units have been installed to date to protect the 675-bed hospital.

Due to the complex nature of the building and the setting, a number of interfaces were included in the project design. They enable other critical equipment to be activated in the event of an alarm, including automatic fire dampers, air handling units, lifts, generators and oil and gas valves. In addition, a modem link was created with St Bartholomew's Hospital, which is two miles away, to alert the Royal London in the event of an emergency.

For more information, go to www.apollo-fire.co.uk

Cables get Underground Approval

DRAKA CABLES has achieved what the company says amounts to the mass transit sector's "gold standard" seal of approval. Several of the company's cable designs have been approved by London Underground as satisfying – and in many cases, exceeding – the safety requirements of Section 12 (underground) areas, as set out in LU 1-085, the current document that details the requirements for the fire safety of materials. Two Draka cables in particular were singled out: the Firetuf FTP120 (until a recent rebranding of the Draka range, known as Firetuf Powerplus) and Firetuf FT Sifer (previously called Firetuf Sifer).

Firetuf FTP120 is designed to ensure that power supplies for both life safety and firefighting systems are maintained in a fire. In addition to its approval by London Underground, the zero halogen, low smoke OHLS cable is approved by LPCB (Loss Prevention Certification Board) and BASEC (British Approvals Service for Cables) and is used in a wide range of applications that call for the highest fire performance, such as firefighting lifts, smoke dampers and other critical life safety systems. It is widely used in buildings where compliance with the

recently introduced BS8519: 2010 is required; demanding fire safety standards that have been adopted by London Underground.

Draka's OHLS Firetuf FT Sifer single-core, circuit integrity cable was developed specifically to meet the onerous testing requirements demanded by London Underground, particularly in relation to its stringent vertical flame propagation testing that exceeds the requirements of BS 7211: 1998.

Other Draka cables, approved by London Underground as meeting the standards set down in LU 1-085, include the Firetuf FT120 (previously known as Firetufplus Enhanced) enhanced-category fire alarm cable that delivers 120 minutes of fire performance as called for in BS 5839. It is also suitable for emergency lighting circuits and can be used in below-ground locations without any restriction.

Also approved by London Underground is the Firetuf FT30 (until recently, Firetuf Easystrip) standard-category fire alarm cable that gives giving 30 minutes resistance to fire. It too can be specified or emergency lighting circuits and be used in below-ground locations without any restriction.

For additional information, contact: www.draka.com

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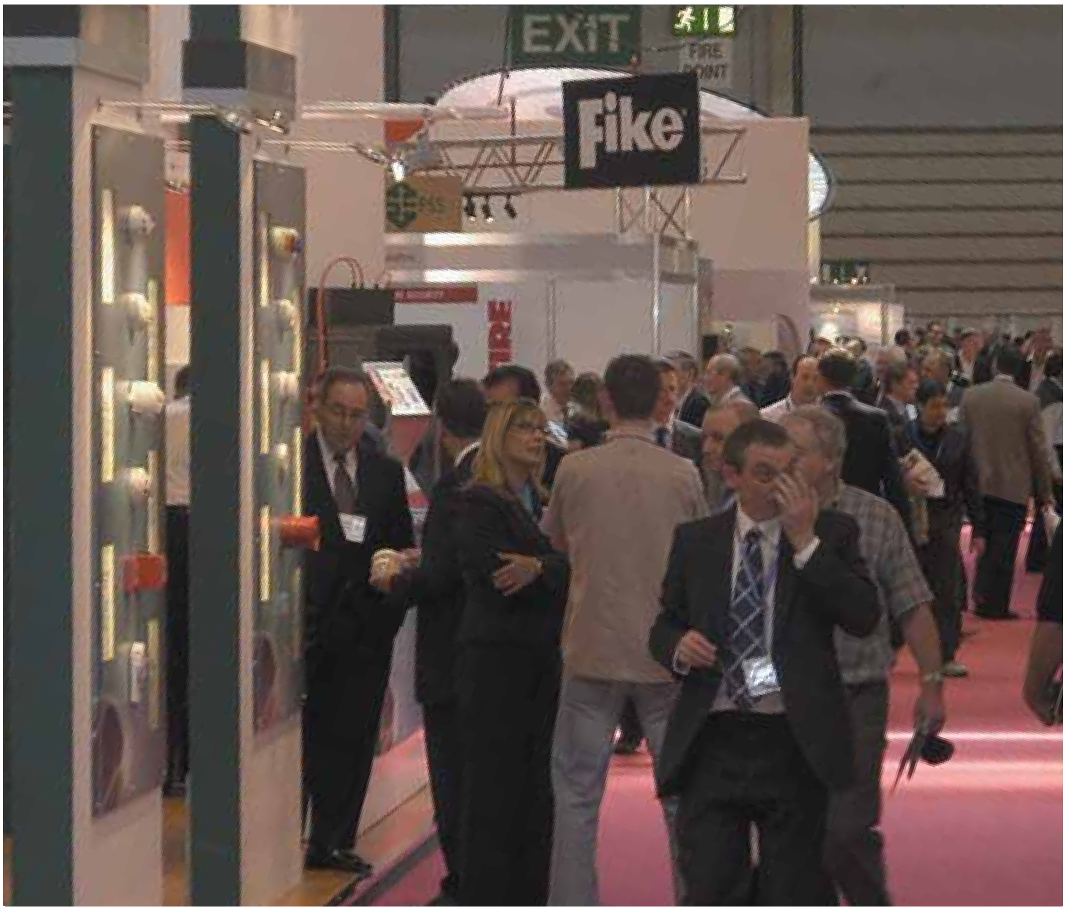

James Blue

UBM Live

International Firex is taking place at the NEC Birmingham from 16th to the 19th May and offers visitors the latest in approvals and compliance, current fire safety legislation, industry best practice and standards. It is one of the largest dedicated fire safety events in the world, showcasing the latest in a wide range of products and services from more than 150 exhibitors.

As a 'Responsible Person' it is your duty to regularly inspect, test and maintain active protection measures such as fire alarms, fire extinguishers and sprinklers and passive fire protection measures that contain and prevent the spread of fire.

An effective fire risk assessment needs to be carried out, in line with the Regulatory Reform (Fire Safety) Order 2005 and you need to formulate a plan of action for the safe evacuation of the building. While non-domestic fires do not often hit the headlines, each year a number of people die or are seriously injured as a result of fires at work.

In recent news, O & C Holdsworth plc, the company that owned the Penhallow Hotel in Cornwall, where three people died in a fire in August 2007 has admitted breaches of fire safety legislation. O & C Holdsworth pleaded guilty to two offences under the Regulatory Reform (Fire Safety) Order 2005 for failing to carry out a suitable and sufficient fire risk assessment and failing to ensure the hotel was properly equipped with detectors and alarms. The investigation revealed a number of breaches of the fire precautions, the most serious of which related to the fire risk assessment.

In addition to the potential loss of life, fire damage costs UK businesses millions of pounds in property damage, compensation claims and insurance premiums. By adhering to fire safety legislation and taking a proactive approach to fire precautions, many fires can be avoided; and if one does occur, the effects can be limited if the right fire safety procedures are in place.

Focusing on fire prevention and fire risk assessment requirements, International Firex presents the latest in approvals and compliance, current fire safety legislation, industry best practice and standards.

With four seminar theatres and five unique feature areas, International Firex 2011 is the biggest in its history. Visitors to International Firex are invited to attend the scheduled seminar sessions, developed for fire safety professionals

ex 2011

across the board, which will run free-of-charge alongside the exhibition.

The five feature areas: Info4fire.com Learning Zone; ASFP Passive Fire Protection Zone; LPCB Red Book Pavilion; FPA info zone; and Fike Village are set to deliver an extensive educational programme with live demonstrations and presentations.

The Info4fire.com Learning Zone

Will be run in association with the Fire Industry Association, the UK's leading trade organisation for the fire safety sector. There will be a range of free seminars and presentations on fire risk assessment, fire alarm system design, emergency lighting, business advice, portable extinguisher maintenance and fire safety legislation. If you are an installer of fire alarms or have concerns about fire safety requirements and legislation, this is where you will find the answers.

The comprehensive sessions are set to be delivered by an impressive line up of industry experts, for example:

- Colin Todd, Managing Director at CS Todd & Associates and Chairman FIA Risk Assessment Council, Nick Coombe, London Fire Brigade and Simon Ince of Warrington Certification will explore Fire Risk Assessment from three different perspectives
- Dave Berry, Vice Chairman, FIA Risk Assessment Council is set to discuss the management of fire safety in buildings, focussing on BS 999 and the varied approaches that can be used to meet Building Regulations for fire safety in new and existing buildings
- Jonathan Herrick, Fire Safety Policy Manager of the West Midlands Fire and Rescue Service, Nick McMahon, Partner at Reynolds Porter Chamberlain solicitors and Colin Todd will take part in an industry panel debate deliberating fire safety enforcement and prosecution issues.

New for 2011 – ASFP Passive Fire Protection Zone

Hosted by the Association of Specialist Fire Protection (ASFP) will focus on products, services and best practice in built-in fire protection. With a strong emphasis on professional expertise and the requirements for approved installers and contractors, the Passive Protection Zone will provide visitors with exclusive access to industry experts and knowledge. A seminar theatre will host a number of presentations from specialists in the passive protection field, with subjects such as:

- Legal Responsibility – What is your defence?
- Maintaining their lives and your liberty.

LPCB Red Book Pavilion

Returns to International Firex to provide visitors with vital information on third-party approval schemes and product testing currently undertaken by the BRE Global/ LPCB. The free seminar programme and exhibitor village will also provide advice and guidance on the importance of third-party approval, including:

- Working with the LPS 1014 Installer Scheme – The Benefits of third-party approval.
- The Fire Safety Order – Challenges for the risk assessor.

New for 2011 – Fike Village

Will provide a relaxed and informal 'village' for Fike Protection Systems and Fike Safety Technology customers to meet and entertain key specifiers and end users attending the show. Working with a number of key distributors, the latest Fike suppression and alarm fire safety products are essential aspects of the Fike Village where the emphasis will be on innovation and technical expertise.

New for 2011 – FPA Info Zone

The Fire Protection Association will be hosting a series of free seminars and surgeries covering a variety of topical issues including:

- Training solutions in the fields of fire detection, alarms and emergency lighting.
- In-house fire safety training – the dos and don'ts.
- The search for good guidance.
- Means of escape for disabled people.

Visitors will also have the opportunity to meet with our experts for informal one-on-one sessions. The FPA info zone will additionally be a place for visitors to relax and network with free refreshments and regular demonstrations of new FPA products and initiatives including FPA Academy – a new online learning portal.

The Fire Excellence Awards, coinciding with the International Firex exhibition, will celebrate the best products, services and individuals in the fire safety industry. Held every two years, the Fire Excellence Awards are set to take place at the Hilton Birmingham Metropole Hotel during the evening of Tuesday 17th May.

Moving away from the serious side of International Firex, info4fire.com will be hosting a virtual ten pin bowling competition on the Nintendo Wii. The info4fire Ten Pin Bowling Challenge will take place throughout the four days of International Firex, with the winners of the tournament announced at 4pm each day, 3pm on Thursday. IFP

INTERNATIONALFIREX

16-19 May 2011
NEC Birmingham

James Blue is Portfolio Director, Fire and Security at UBM Live

For further information, go to www.info4fire.com/internationalfirex

IWMA
International Water Mist Association

International Water Mist Conference 2011

12 - 13 October

Hamburg, Germany

For more information please see

www.iwma.net

Special Feature:
Join the free exhibition on the first conference day and meet all major water mist system manufacturers in one place!

Registration

Name ______________________________ First Name ____________________________

Organization Address ____

Tel.: ______________________________ Fax: ____________________________________E-mail: ____________________________

Payment received on or before 27 June	Members **460 Euro**	Non-Members **520 Euro**
Payment received after 27 June	Members **520 Euro**	Non-Members **580 Euro**
On-Site Registration	Members **540 Euro**	Non-Members **600 Euro**

☐ Bank transfer ☐ Credit Card* *Payment by credit card available for attendees outside Europe through Paypal

Date _______________ Signature ________________________________

Fax or mail this registration form to: **International Water Mist Association**, Biederitzer Str. 5, D-39175 Heyrothsberge, Germany,
or register online at **www.iwma.net**

Phone +49 - 392 92 - 690 25 **Fax +49 - 392 92 - 690 26** **E-mail info@iwma.net**

Total Flooding Added to Offering

FIRETRACE INTERNATIONAL, best known for its Firetrace fire suppression systems for the protection of "micro-environments" has expanded its fire detection and suppression offering with the launch of its full-room, Firetrace Total Flooding system. The new system is seen as complementing the company's tube-based Firetrace solutions, which are now protecting in excess of 150,000 installations around the world.

Commenting on the announcement, Bill Eckholm, President and CEO of Arizona-based Firetrace International said: "We remain committed to the principle that the majority of business-critical assets are most cost efficiently and effectively safeguarded by providing them with dedicated in-cabinet protection. However, we recognise that there are some applications that may be best suited by a total flooding system. Now the customer can have one company evaluate the best approach and supply the best solution without the bias of offering only one solution or the other."

The new engineered and pre-engineered Firetrace Total Flooding system is UL (Underwriters Laboratories) listed and utilises DuPont FM-200.

Coinciding with the launch of Firetrace Total Flooding. Firetrace International announced the opening of Dubai-based Firetrace International Middle East LLC. This new company will provide dedicated support to customers throughout the region.

For additional information, contact: www.firetrace.com.

Insulated Cable for Hospital Upgrade

12,000 metres of FP Pus cable from PRYSMIAN have been installed in the upgraded fire alarm system at the Southampton General Hospital Neurology Centre in the UK. This latest generation FP Plus cable with Insudite insulation is claimed to offer excellent resistance to damage while also being approved for fire detection and fire alarm critical signal paths to BS 5839-1:2002+A2:2008 for enhanced-category applications.

In addition to approvals to BS7629-1 and BS6387 Category CWZ, FP Plus has received BASEC and LPCB approval to BS5839-1:2002 for enhanced-category applications. This includes approval to BS EN 50200 Class PH120 and the new integrated fire, shock and water test BS8434-2 for 120 minutes. All Prysmian FP Plus cables are manufactured under an ISO 9001 Quality System certified by BASEC.

For additional information, contact: www. prysmian.com

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More building space, more design flexibility

More time savings, lower installation costs

More solutions for code compliant protection of both air and grease ducts

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FyreWrap® Elite™1.5 Duct Insulation is ideal for the insulation of duct systems in hotels, schools, restaurants, high rise condos, medical facilities, research labs, and sports arenas and stadiums. This flexible, lightweight duct wrap provides a single fire protection solution for both air distribution and grease duct systems.

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A FyreWrap product specification in several formats is available at www.arcat.com; search using keywords Unifrax, FyreWrap or www.unifrax.com. For more information on FyreWrap Elite 1.5 or other products, certifications, code compliance, installation instructions or drawings, contact Unifrax Corporate headquarters USA at 716-278-3800.

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Steiner tunnel windows and cover

Code-compliant Solution for Combustible Plenums

Sarah Brewer

Unifrax I LLC

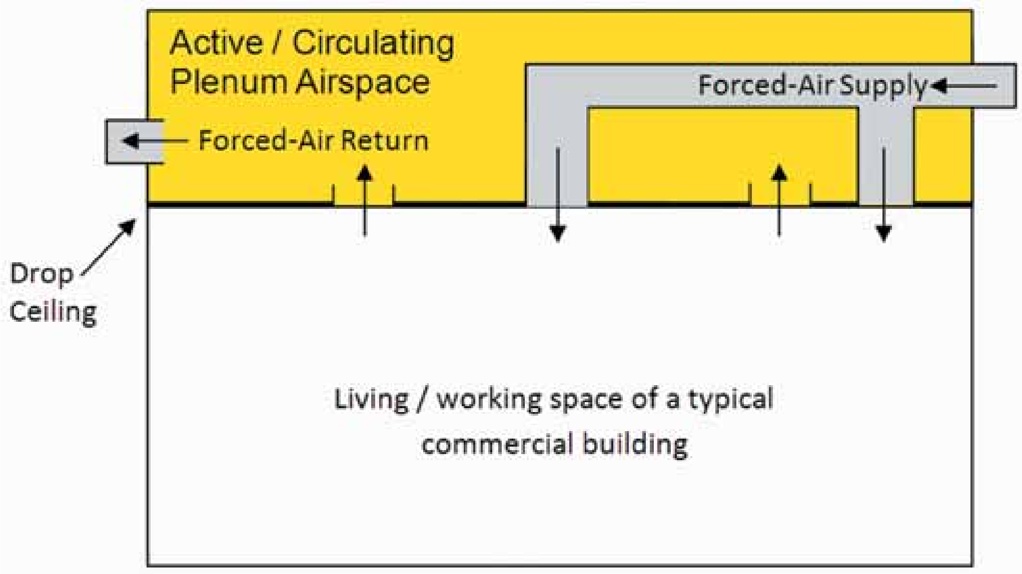
Fire protection wrap systems can provide a code-compliant solution for combustible items in commercial building plenums, areas above the ceilings or beneath raised floors in which various building services are often run.

The concealed nature of the plenum space, chemical composition of many plastic plenum items and the quantities in which items can be installed, create a serious fire and life safety challenge. National building construction codes recognise this threat and significantly limit, and in some cases prohibit, the installation of specific types of combustible items in plenum areas. For site errors, where non-plenum rated cables and pipes are mistakenly installed, fire protection wraps provide a tested solution that will bring the installation in to code compliance. Benefits of plenum protection (PP) systems go beyond "problem fixing" and can provide the entire construction team with justification for the proactive utilisation of fire protection wraps as a preferred plenum installation configuration.

What constitutes a plenum, and what are typical plenum items?

A plenum is an enclosed portion of the building structure, other than an occupiable space being conditioned, that is designed to allow air movement, and thereby serve as part of an air distribution system. Supply, return, exhaust, relief and ventilation air plenums shall be limited to uninhabitable crawl spaces, areas above a ceiling or below the floor, attic spaces and mechanical equipment rooms are also used to house the building's communications cables for computer and telephone networks and audio visual equipment. Since a plenum space cannot be used for storage, there are code requirements for the removal of abandoned, unused cable that could, over time, create an added hazard.

Diagram of a typical plenum



Typical plenum items may include, but are not limited to:

- Plumbing: water supply lines, drain/waste pipe, fire sprinkler pipes, and pneumatic tubing.
- Electric Wiring: power cables, fibre-optic cables, communication and AV cables.
- Other items: restaurant beverage lines.

Plenum testing requirements and compliance options

Building codes govern requirements regarding items located within environmental air handling spaces. The code imposes mandatory conformance to a construction requirement that is administered by a local governmental agency. Compliance is typically enforced through review of project submittals and on-site inspections.

The codes specify the fire test standard to be utilised to evaluate performance to a minimum set of criteria. Fire protection requirements for materials located in plenums can be found in a variety of buildings codes, including sections relating to mechanical, plumbing and electrical applications. In the United States, plenum regulations are covered in the International Mechanical Code (IMC), the National Fire Protection Associations' NFPA 70 National Electrical Code (NEC) and NFPA 90A. Other plumbing codes likely also apply.

Taking one code as an example, the IMC, Section 602 on plenums clearly states that materials (the exposed item) in plenums shall be non-combustible (no combustibility is verified through testing to ASTM E 136) or the item itself must achieve 25/50 flame spread/smoke developed ratings to ASTM E 84.

For a few specific plenum items (that typically contain some organics) compliance with other fire test criteria is required. The code clearly defines these requirements as:

- Peak optical density not greater than 0.50.
- Average optical density not greater than 0.15.
- Flame spread of not greater than 1.524 metres.
- The fire test standards to be utilised to evaluate these properties are dictated by the plenum item type and are listed below. Items that meet the performance criteria are referred to as "plenum rated". Plenum rated should not be confused with "riser rated", which covers cables that run between floors of non-plenum areas where the requirements are not as strict.
- Wiring: to NFPA 262.
- Fire sprinkler piping: to UL 1887.
- Pneumatic tubing: to UL 1820.
- Raceways: to UL 2024.

IMC Section 6.2.2.1, Exception 5 provides direction on the use of combustible items in plenums and states: "Combustible materials are to be fully enclosed within continuous non-combustible raceways or enclosures, approved gypsum board assemblies or within materials listed and labelled for such application".

Since in Exception 5, the code does not clearly define the fire test standard to be utilised for evaluation of a combustible item within the listed and labelled material, the above listed plenum test methods are used to evaluate the combustible item, together with the exterior applied fire protection wrap, as a tested system.

Therefore, to be code compliant, the following options are available for installation:

1 Non-combustible items.
2 Plenum rated items.
3 Combustible items enclosed in a non-combustible raceway (EMT).

Steiner tunnel burner

Code Compliant Option	Limitations
Non-combustible Item	Weight – equipment to manoeuvre heavy item Labour – required joint connection technique
Plenum-rated Item	Cost – higher price of plenum rated item Performance limits versus combustible version
Combustible item enclosed in non-combustible raceway	Cost – of added raceway Labour – difficulty constructing horizontal shaft
Combustible item enclosed in fire-rated shaft	Labour – secondary installation of added raceway Space – needed for shaft, limited work area Temperature – gypsum limited to areas $\leq$ 125ºF
Combustible item in fire protection wrap	Acceptance – appropriate test documentation Defining value of wrap versus alternate choices

4 Combustible items enclosed in a fire-rated shaft to isolate from the plenum area.

5 Combustible items enclosed in a fire protection wrap; a tested plenum protection (PP) system.

Considerations and limitations of plenum options

Although there are a number of code compliant options, each has limitations that must be considered relative to the potential value it provides. Some of these considerations are captured in the table above.

These limitations may not be an issue for every project, but special conditions or the building design may create the situation where an alternative installation could or should be considered. Even non-combustible items, such as cast iron pipe, can be costly to install due to the weight of the item and need for equipment and labour to install. Plenum-rated versions of pipe and cable can offer reduced weight and simpler joint connection techniques. However, plenum-rated items are premium priced, which may offset potential labour savings. In addition, enclosing a combustible item in a non-combustible raceway is subject to the added cost of the raceway and secondary labour to install it.

In some jurisdictions, combustible items installed in plenums are permitted to be isolated from the rest of the plenum space by enclosing them in a fire-rated shaft. Shafts and plenum enclosures shall be constructed of materials permitted for the type of construction classification for the building. It should be noted that the use of gypsum board to form a plenum (or air handling duct) is limited by the code to systems where the air temperature does not exceed 52°C and the building and mechanical system design conditions are such that gypsum board surface temperature will be maintained above the air-stream due point temperature. This is instituted as a safeguard against mould growth. Therefore, the code-defined temperature limitation will likely restrict the option to use fire-rated gypsum board shafts if any part of the board enclosure is within a plenum subject to elevated temperatures. An alternate method of isolating and enclosing the combustible item, such as use of a fire protection wrap material, would alleviate the potential misapplication of the board.

One limitation for fire protection wraps is the lack of awareness of this code-compliant option and ensuring local approval of products is being made based upon appropriate testing and listing documentation. Defining the "general" value of wrap systems versus alternate plenum choices is challenging due to the variety of conditions that can exist on projects. However, documenting the technical challenge and resulting savings for

Combustible pipe bundles protected with a wrap system that were undamaged by the fire test exposure

specific project situations can provide powerful testimonials and data from which future informed decisions can be made.

Fire protection wrap as a problem solver

Code allows combustible items to be fully enclosed within materials listed and labelled for such purpose. When combustible items are mistakenly installed in a plenum space, they are typically removed and replaced with compliant items. This is a very costly and time consuming process. As an alternate to replacement, materials have been developed that can be wrapped around the combustible item, keeping it from the degrading under fire conditions. These materials are qualified through fire testing of the combustible item and wrap together as a system to one of the plenum fire test methods dictated by the item type (such as NFPA 262, UL 1887, UL 1820 or UL 2024).

These fire tests are a modified version of ASTM E 84 and utilise the Steiner Tunnel furnace. Testing is conducted at a nationally recognised testing laboratory (NRTL) such as Intertek, ETL or UL. Passing systems are listed under the plenum protection (PP) category in the lab's Certifications Directory and can apply their listing mark to the material packaging and product. Listing marks provide specific details on the application for which it has been qualified. Care should be taken to ensure the listing is applicable for use in environmental air spaces and not for some other electrical or fire protection property.

Features of fire protection plenum wraps

The product and system features of fire protection wraps make them popular and beneficial for use as a plenum protection system. Typical features include:

- Flexible, fibre insulation blanket.
- High temperature capability (1100°C) operating temperature.
- Thin, uses little space (12mm thickness).
- Light weight, easy to handle.
- Able to conform to complex configurations.
- Simple installation technique – 25mm material overlaps.
- Common attachment material – steel tie wire or banding.
- Non-combustible (wrap material).
- 25/50 flame and smoke ratings to ASTM E 84 (wrap material).
- Listed and labelled as plenum protection (PP).
- Testing on a variety of plenum items (cable, pipe, single, bundles).
- Testing on a variety of plastic chemistries.

Since code requires exposed plenum items to be non-combustible or have a 25/50 rating, some have assumed that a combustible plenum item can be covered with any 25/50 rated material to bring it in to compliance. This is a false assumption. The reason for this is that the offending combustible item needs to have been tested "as wrapped" to verify that the combined system can achieve the required flame and smoke ratings. An individual material may pass the flame/smoke criteria but may not provide enough protection for the combustible item within the wrap to also pass the test.

Reasons for this may include shrinkage of the covering material, inadequate insulation properties or thickness to prevent the passage of heat to the inside and degrading the combustible item. Most insulation materials that have a 25/50 rating, have neither been tested as a system with the combustible item or items, nor can they provide any listings verifying testing "for such purposes" as the code requires. Only plenum protection (PP) listed systems provide the testing documentation that "Authorities Having Jurisdiction" (AHJ) need to confidently approve these materials for use on projects and to solve job site issues.

Simple steel tie wire attachment method

Application	Potential Benefit
Roof drains	Run drain pipe inside structure to improve building aesthetics
Heating/cooling fan coil units	Substitute copper tubing with lower cost PVC plus wrap to provide both fire protection and condensation insulation (R value)
High purity water supply lines	Use of plastic formulas that exhibit superior low surface roughness, reducing incrustations or formation of bacteria
Water lines with corrosive or abrasive liquids	Use of plastic formulas more resistant to scale or corrosion due to exposure to household chemicals or industrial applications. Offers long, low maintenance service life.

Fire protection wrap as a pre-engineered alternative

Fire protection wraps provide benefits that exceed the basic product features that suffice for its use as a project problem solver. These benefits can be significant enough that designers, building owners and contractors are proactively seeking approval of these systems, many of which are on high profile projects. The table above shows a few applications for which plenum wraps have justified their use and a proactive approach.

A fire protection wrap system is shown installed on combustible plastic roof drains that were relocated to the inside plenum area of a corporate headquarters building to improve design aesthetics.

The future of fire protection wrap systems

Fire protection wrap systems that have been listed and labelled for plenum protection (PP) have recently become a viable code-compliant option for combustible plenum items. A growing portfolio of plenum installation case histories provide proof fire protection wraps offer value to designers, building owners, installers and code officials, evolving from "problem solver" to "engineered alternative". As awareness improves, fire protection wraps will provide a broader group of industry professionals the value and solutions they desire to achieve their project goals. IFP

Sarah Brewer is a Group Product aManager at Unifrax I LLC

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Fire Protection in Public Buildings

Keith Minster

Morley-IAS by Honeywell

The continuing tough economic global landscape continues to put pressure on capital building programmes in both the public and private sectors. One outcome of this has been a switch in focus in many cases to refurbishing and upgrading existing premises where the additional outlay for a complete rebuild or replacement cannot be justified.

In the case of buildings designed for public use in particular this presents both a challenge and an opportunity for providers of fire safety equipment, Refurbishment demands a different approach by specifiers and suppliers, one based on maximum flexibility.

A simple example comes when attempting to meet the inevitable demand to do more with less. New fire safety solutions may have to work with legacy systems – maintaining continuity of protection during changeover and on a longer-term basis – or provide suitable protection within an existing site undergoing change of use.

Interoperability

A best-practice fire detection and alarm safety solution is likely to offer a high degree of interoperability, whereby different systems work together or inter-operate. This will help make the most of any existing investment and enable a seamless transition as the building undergoes a broader programme of change.

What does this mean in practice? In looking at upgrading a fire safety system within a refurbishment programme, it may be, for example, that only part of the existing system needs replacing.

The most effective response is likely to be to select a replacement panel – or add additional networked panels – that operate on an open protocol principle in supporting any existing devices that do not require upgrading. At the same time, interoperability is important in maintaining full continuity of protection across the site during what is often a phased period of refurbishment.

The need for flexibility will also apply in buildings originally installed with a shell and core scheme. Here, the basic house fire protection system is designed to cover the shell of the building only – including public areas such as stairwells and lifts – but protecting the offices themselves is the responsibility of individual tenants.

The result can often be a maze of different fire panels and detectors, demanding even greater flexibility from the new solution when the time comes to upgrade all or part of the building. In addition, this may involve different levels of fire safety provision, depending on the demands of the individual tenant or their insurer.

The need for flexibility is essential, particularly when installing fire detection and alarm systems in existing public buildings, to make the most of any existing investment and enable a seamless transition from old to new.

Another issue to be considered is the quality of the existing wiring. Here again, it is important to select a flexible solution that is highly tolerant of legacy systems about which little may be known. Critically, this will reduce any additional expense – including replacement wiring as part of the commissioning process, at the same time ensuring an acceptable ongoing level of fire safety.

A question of age

In developing an appropriate fire safety solution for a public amenity, the use to which it is put is usually much more important than the age of the building.

As a result, if a primary concern is to protect the fabric of the building or its contents, the proposed solution is likely to be broadly similar, irrespective of whether it is a new build or an historic architectural jewel. Similarly, if a leisure facility typically attracts especially large numbers of visitors within a restricted, enclosed space, the type of life safety solution and stringent evacuation procedures adopted are more likely to vary dependent on the layout of the building rather than its age.

However, things start to change significantly when it comes to detailed specification and installation. In most cases, installing a fire safety solution in a new build is much simpler and more straightforward. Historically, fire safety was often regarded as an after-thought or a 'bolt on': today, by contrast, architects and consultants recognise the inherent importance of life safety provision within building design and so increasingly involve third-party fire systems specialists early on in the development process.

In so doing it ensures the best possible solution, with wiring discreetly installed in the ceiling void or floor space as part of the initial design, rather than having to compromise or adapt the architect's original intentions by accommodating fire safety requirements too late in the process. In the case of an existing building, by contrast, the infrastructure is already in place, making the replacement of, or addition to, an established fire safety solution more complex. And, if the building has protected status as a result of its architectural importance, any redevelopment can be especially problematic.

There is no doubt that developing life safety systems for historic buildings presents special challenges. Yet the latest technologies sympathetically installed can provide the highest levels of protection for both people and property – without detracting from the visual impact of the landmark building itself.

The role of voice

Recent research identified that fewer than 10% of the general public always think about how to get out of a building, whether or not they use it regularly. In the event of a fire alarm, the most common response is to follow the people around them, with more than one quarter of respondents assuming that it is a false alarm until told otherwise.

As a result, it is critical to ensure that staff and visitors alike within any public building are able to respond quickly and correctly to a fire warning. Sophisticated and intuitive voice alarm (VA) technology has evolved to form a key part of comprehensive fire detection and alarm systems, designed for complex environments in which individuals will respond to warnings in different ways.

Integrated solutions benefit both building users and firefighters called to deal with the emergency, as they are able easily to take over the VA/PA system to broadcast individualised messages, in order to ensure a rapid yet controlled evacuation from any part of the premises at risk.

Though awareness as to the importance of voice is growing, the uptake of such products is still relatively slow. VA/PA solutions are principally used only as directed by the design authority, or where the provision of a PA system to meet other needs makes the incremental cost significantly lower than where a simple upgrade from sounders is being considered.

Having said that, though budgets may be under extreme pressure, compliance demands have increased in requiring safe and environmentally-friendly public venues. Today, many buildings, particularly those with a large number of public attending or requiring complex evacuation, may include an element of voice. As a result, such comprehensive detection and alarm solutions enable a faster, safer response.

The life safety industry continues to place a high development priority on the addition of voice to its armoury of fire detection and response solutions. The result is that cost-effective and fully-integrated systems are available that enhance the user experience, providing a wide range of safety and other


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Beacon centre for the blind

A Morley-IAS system has been installed in the newly-built Beacon Centre for the Blind headquarters in Wolverhampton in the UK, which opened in 2010.

The Beacon Centre began life back in 1875 and has since provided an increasing range of support services for the local visually-impaired population. Today, the new multi-function building incorporates extra care accommodation and an activity centre providing facilities such as a fully-equipped health and fitness suite, restaurant, sensory garden, meeting and conference rooms and charity administration offices.

The Morley-IAS L2 system selected comprises two networked ZX5Se panels linked to more than 600 analogue addressable devices, including 275 sensors, approximately 200 sounders and 100 sounder strobes.

Gary Long, head of principal contractor, William Davis' electrical division, comments: "The Centre is a state-of-the-art care facility that is transforming the lives of thousand of visually impaired people. The focus on design was paramount to this project therefore it was essential to incorporate a flexible and high loop capacity fire protection system that would be easy to operate, provide early warning of possible problems yet minimise the risk of false alarms."

The company's ZX Series panel's network flexibility and high capacity made it especially well-suited to a building requiring a high volume of sounders as well as optical devices, in meeting the needs of visually-impaired residents and other users.

information messages. Allied to this, the latest graphics solutions providing full information in a clear, simple format allow staff and attending fire crews to quickly locate, understand and respond to any fire-related incident that arises.

Multi-criteria detection

In supporting early fire detection and response in public buildings, another important development has been that of multi-criteria detection. These devices are becoming more commonplace, moving from their earlier niche positioning to mainstream application in both enabling earlier fire detection and minimising false alarms.

Not surprisingly, the reason for this is primarily economic, as the cost of downtime or lost business due to false alarms increases together with a loss of confidence in the system itself. As a result, the reduction in false alarms is now a principal focus for product development within major fire safety equipment manufacturers. And here, critically, multi-criteria sensors are less prone to false alarms than their single-sensor counterparts, as it is more difficult to falsify two criteria than one, three more than two, and so on.

Full multi-criteria protection is ideally suited to those areas where the cost of downtime is especially significant. It is equally well-suited to sports and leisure industry environments where there are often large numbers of people in a single location.

In summary, fire safety solutions that both ensure full compliance and provide the flexibility needed to meet the specific demands of any project can be delivered within the constraints of today's toughest budgets. IFP

Keith Minster is Sales Manager UK & Ireland at Morley-IAS by Honeywell

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Portables, the First Line of Defence

Graham Collins

Despite some dissenters, portable fire extinguishers are generally well established as a first line of defence when a fire breaks out, and today there are a number portables on the market that are designed for special risk environments.

Portable extinguishers are arguably one of the best and most cost-effective ways of fighting a fire at its outbreak. In the right hands they can save lives and minimise damage to property by extinguishing a small fire or, at least, containing it until professional firefighters arrive on the scene.

Broadly speaking, modern portables are one of two types, and models are now available that are designed for use for clearly identified fire risks. These two types are stored-pressure portables and gas cartridge extinguishers. The stored-pressure extinguisher normally has a pressure gauge and, when the valve is opened, the pressure forces the extinguishant out of the extinguisher. A gas cartridge portable is operated by puncturing an internal gas cartridge, which then pressurises the extinguisher, enabling the portable to operate in the same way as a stored-pressure extinguisher.

There are a number of "standard" portables on the market today: water, foam, CO_2 and dry powder. There are also a growing number of "special" portables now available, each of which is dedicated to fighting a specific fire risk.

Water portables are for use against Class A fires involving flammable solid materials such as wood, paper, straw and cloth, and their application is widespread throughout industry. A recent new dimension to this type of portable has been the incorporation of anti-freeze protection; ideal when the portables are likely to be positioned outside on loading bays or platforms. Foam extinguishers are suitable for both Class A and Class B fire risks involving flammable liquids or liquefiable solids. The majority use AFFF, which is well suited to fires involving petrol, tar, paints and oils.

CO_2 portables are also suitable for Class B risks; they are also the most appropriate to use on electrical fires and so are commonly found protecting IT equipment. Powder portables are also appropriate for Class B risks, as well as Class A and Class C fires involving gases, so often are the most suitable choice for mixed risk environments.

However, these so-called "standard" portables are not designed to fight very specific fire challenges. This has resulted in a number of special portables coming onto the market in recent years, each aimed at fighting a particular fire risk. A word of caution is worth raising though. Due to the specialist nature of these extinguishers and the particular dangers involved with many of these fires, the need to seek expert advice and ensure that every potential user is properly trained to use the extinguisher cannot be over emphasised.

These special purpose portable extinguishers include:

- Non-magnetic portable extinguishers for use in hospitals and clinics.
- Special extinguishers designed to fight metal fires.
- Specially-formulated portables for polar liquid fires.
- Specially formulated portables for sawdust fires.
- Portable extinguishers specifically for coal dust fires.
- Extinguishers for cooking oil and fat fires.

Non-Magnetics for the healthcare market

Hospitals, health centres, clinics and other locations have a particular portable extinguisher challenge. Magnetic interference – a problem causing increasing concern in medical circles – has the potential to damage very expensive and highly sensitive electronic medical equipment such as MRI or NMR spectroscopy facilities or put the equipment's performance in doubt or at risk, with possible life-threatening consequences.

The most appropriate portable for these applications is a non-magnetic fire extinguisher typically using CO_2 (carbon dioxide) that is suitable for all Class B fires involving flammable liquids or liquefiable solids. These portables are constructed entirely from non-magnetic materials, and the use of aluminium for the cylinder body ensures that it is lighter than conventional Class B extinguishers.

Metal fire hazards

Metalworking production areas in, for example, vehicle manufacturing and household appliance plants, are a somewhat unique fire safety risk. Light metal and alloy waste, swarf and powder can catch fire during machining operations and can, typically, reach temperatures in excess of 2000°C. The chemical industry, laboratories and nuclear power plants all have to contend with similar fire safety risks.

Combustible metals oxidise rapidly when exposed to air, moisture and oxidising agents, and the heat released by this reaction can cause the metal to reach its ignition temperature, resulting in a fire. The risk of this happening is greatly increased if the metal is in its molten state or is in small filings or particles.

Combustible metal fires – Class D fires – typically involve metals such as aluminium, calcium, lithium, magnesium, potassium and sodium, and conventional Class D portable extinguishers frequently use agents that have a high risk of chemical reaction, endangering the portable's user. Indeed, most alkali metals are highly combustible, are very easily ignited, and can react with water to create hydrogen, a highly combustible gas. To overcome this, the latest metal fire portable extinguishers use specially developed dry powder extinguishants that work by forming an oxygen-excluding crust on the combustible surface, starving the fire of oxygen and insulating the metal to prevent the fire spreading to other materials close by.

Fighting polar fires

Polar solvent liquid fires are most prone to occur in adhesive cosmetic and pharmaceutical manufacturing environments. They are also prevalent in the distilling industries and where household, commercial and industrial cleaning products and disinfectants are produced.

Conventional foam extinguishers are known to be ineffective on polar fires. However, a number of specially-formulated foam agents are now available that are effective on a wide range of polar liquids. These include acetone, alcohol, ethanol, methanol and propanol.

The sawdust fire challenge

All it takes is just one spark from a saw to set sawdust ablaze, and this is a challenge for every door and window manufacturer, joinery shop, kitchen and bedroom furniture maker, and plants processing timber products such as plywood and chipboard.

While smouldering sawdust fires generally respond well to water, conventional Class A water extinguishers lack the ability to deliver the water in the most appropriate way, and water alone is not always the most effective firefighting agent. However, a more efficient solution is to use a portable that contains a specially-formulated water-based agent that is delivered in the correct drop size and flow intensity to fight sawdust fires.

The coal dust fire threat

Coal dust and other dust fires, particularly in the mining and quarrying industries, pose a very real threat. Even the smallest amount of kinetic energy can initiate a coal dust explosion with disastrous consequences. Coal dust has far more surface area per unit weight than chunks of coal, and is more susceptible to spontaneous combustion. A nearly empty coal store or coal container is a greater explosion risk than a full one.

To overcome this very real danger, extinguishants have been developed with a high MAP [Mono Ammonium Phosphate] content, an established fire retardant that assists the powder's chemical reaction with the fire.

Cooking oil and fat fires

Fat and cooking oil fires are notoriously difficult to extinguish, due to their high auto-ignition temperatures. Conventional extinguishers are ineffective, as they do not cool the burning fat or oil sufficiently and may even cause flashback, putting the conventional portable operator at acute risk.

These risks have been overcome by the development of specially-formulated wet chemicals that, when applied to the burning fat or oil, cools and emulsifies the oil, extinguishing the flame, sealing the surface and preventing re-ignition.

Cause for concern

With such a sophisticated offering, it is hardly surprising that portable extinguishers are judged to have the potential to make a major contribution towards fire safety. However, there are grounds for concern regarding the quality and reliability of some portables on the market.

So, certification by an approved, independent third-party accreditation organisation is essential to ensure that the extinguishers being offered as being built to an approved standard genuinely meet, and continue to meet, the appropriate standards.

The importance of this third-party accreditation is that the user can be sure that the extinguisher he is buying today is built to exactly the same standard as the model that was originally tested and approved. If the extinguisher is from a producer that does not have this third-party accreditation there is, in reality, no guarantee whatsoever that it is manufactured to the standard displayed on the cylinder.

Earlier models from that supplier may have been, but re-sourcing steel and accepting a different specification, changing the inside or outside coating of the cylinder, or modifying the design are just examples of changes that can affect the performance of a portable extinguisher. Performance in an emergency is, of course, the ultimate test; it is also not the time to discover that the extinguisher that has been selected fails to function properly. IFP

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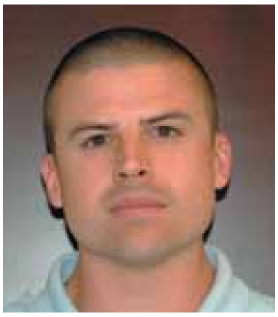

Brian Quick

Detector Electronics Corporation

Inadvertent toxic or combustible gas releases present safety challenges in many industries and can create hazardous situations. Detecting unwanted gas releases should be an objective for decreasing the hazards to workers, equipment, and surrounding areas.

Risks from gas leaks can take on many forms, and there are three main types of gas hazards: combustible, toxic, and oxygen (O2) depletion:

- The risks of combustible gas leaks include fire or explosion when the gas comes in contact with an ignition source. The source may be a hot surface, a spark, an open flame, or even friction associated with gas escaping from a pipe fissure.
- The risk of toxic gas is its detrimental effect on personnel working in the area. Even at low concentrations measured in the parts-per-million (ppm) ranges, certain toxic gases can cause death by asphyxiation or poisoning.
- The risk of oxygen depletion arises to humans if the air does not have a certain minimum concentration of oxygen. Specifically, when oxygen levels in the air drop below 19.5%, the condition is considered to be oxygen deficient. When O_2 levels drop below 16%, the area becomes dangerous causing decreased mental effectiveness, visual acuity, and muscular coordination.

Gas detection technology and techniques

With different types of gases come different types of gas detection technologies. The technologies discussed in this article are described as fixed-detection devices. A fixed detector is a detector that is permanently placed in a location where potential gas leaks might occur, and most gas detector manufacturers offer the following types of fixed-detection devices: point, open-path, acoustic, or sampling systems:

- Point detectors, either combustible or toxic, are strategically placed to monitor a specific location or point. Gas must come in contact with the detector to generate an alarm.
- Open path or Line of Sight (LOS) detectors consists of two modules that pass a light beam between them. When a gas cloud passes through with the beam, the gas concentration is measured. It is common practice to combine LOS detection devices with point detectors to improve detection.
- Acoustic gas detection devices sense the ultrasonic high frequency sound from a

high-pressure gas leak. Although these devices are fixed, they do not have to wait for the gas to contact them in order to detect a leak. In some applications, acoustic gas detection is faster than other fixed gas detection technologies.

- Sampling detection systems extract an air sample, monitor the air within that sample, measure the gas concentration, then exhaust or return the air to a safe location or its point of origin.

Detection choices for combustible gas

A combustible material is a solid, liquid, or gas that may undergo the chemical reaction of combustion. Two common sensor technologies for the detection of combustible gases are catalytic and infrared absorption.

The Catalytic Gas Sensor (CGS) is the traditional and most frequently used sensor to detect combustible gas. The principle of operation of a CGS detector is based on heat created by the catalyzed response between oxygen in the air and the combustible gas. As the catalyst bead (pellistor) temperature rises, a change in resistance of the platinum wire within the bead determines the measurement of gas. Catalytic sensors are small and measure combustible gases from 0% to100% Lower Flammable Limit (LFL).

Of all available gas sensors, CGS offers the greatest range of detection of combustible vapours. In addition, CGS offers good repeatability and accuracy with a low initial cost. Limitations of CGS sensors include the need for 10% or more of O_2 to work correctly. A rapid increase of a high concentration combustible gas can quickly move the ambient air out of the sensor and result in insufficient oxygen to maintain the catalyzing process. In addition, because these sensors fail without annunciation, they require routine bump testing and calibration – typically every three months – to ensure the device is working correctly. Lastly, catalytic sensors are susceptible to poisoning from a variety of substances such as silicones, halogens, acid, PVC vapours, and other corrosive materials.

Infrared (IR) gas detection is based on the principle that hydrocarbon combustible gases absorb specific IR wavelengths of light. The detector contains an IR light source and IR sensor to measure the intensity both at the absorption wavelength and a non-absorbed wavelength. If gas is present in the optical path, the intensity of light is reduced and this change provides the data that is used to calculate the gas concentration. The use of IR gas detectors is growing quickly especially in the oil and gas production and refining industries. Reasons for this trend include:

- Immunity to poisoning from contaminants.
- Low maintenance.
- Unaffected by prolonged exposure to gas or high gas concentrations.
- Unaffected by changes in oxygen level.
- Factory calibration.

One of the most important advantages IR gas detectors have over CGS is that they have fail-safe operation, meaning the sensor is able to detect and indicate conditions in which it is unable to function properly. IR sensors only detect hydrocarbon gases and are unsuitable to detect gases such as hydrogen. Only install IR detectors in applications where hydrocarbons are present.

Detection choices for toxic gas

A toxic substance may be described as a chemical compound that can cause a wide range of damage to humans, ranging from minor irritation to death. Many toxic gases are also combustible. In these cases the potential for personal harm determines the appropriate detection approach. Limits for short and long-term exposure have been set by occupational safety and health agencies such as Occupational Safety and Health Administration (OSHA) in the USA and Control of Substances Hazardous to Health (COSHH) in the UK.

The most common fixed-detector technologies available for toxic gases are electrochemical cells and Metal Oxide Semiconductor (MOS) sensors.

Electrochemical (EC) sensors consist of gas diffusion electrodes connected externally via a load resistor. These electrodes are encased in a permeable membrane that diffuses the gas across the electrodes. All this is then submerged in an electrolyte. The EC sensor yields stable and repeatable readings, and is a good choice for detecting a wide range of toxic gases in many different applications. Other advantages of EC sensors include:

- High sensitivity.
- Low power requirements.
- Direct linear output of current to gas concentrations.

These sensors have some limitations; the electrolyte material can evaporate and restrict the sensor's use in very hot or very cold environments. Also, EC sensors require routine calibration and are not fail-safe.

MOS toxic gas detectors are most frequently used if the target gas is hydrogen sulphide. There are many variations of MOS toxic gas detectors, one of which is the Nanotechnology Metal Oxide Sensor (NTMOS). Although the name sounds

similar to MOS technology, NTMOS is quite different.

The sensor has a large sensor surface area that absorbs gas vapour. The target gas reacts with the metal oxide and changes the electrical resistance of the oxide film. This resistance change is non-linear and specific to each sensor, so it is correlated to the gas concentration. The increased surface area of NTMOS means a faster response and higher sensitivity; typically T50 is less than five seconds. The pure material design avoids the common syndrome of typical MOS sensors to "fall asleep". NTMOS sensors are rugged and long lasting. They also tolerate extreme temperature and humidity ranges found in the North Sea, Middle East, Canada, Russia, and the Gulf of Mexico.

Placement of gas detection

To determine the ideal location of gas detectors, many factors must be considered, such as the flashpoint, the vapour density, and the environment in which the potential hazard exists. In this article, we consider vapour to be either a gaseous material formed by boiling/evaporating of a liquid or a gaseous material that acts as a gas in normal temperatures and pressure.

When gas detection is used to detect vapours from combustible liquid leaks in a process or storage, knowing the flashpoint of the liquid enables the user to determine whether gas detection is a viable option.

The flash point is the lowest temperature at which a liquid will start to give off detectable vapours. If in the application the material is used at or above the temperature of its flashpoint, gas detection can be used. However, if the flashpoint of the liquid is higher than the ambient working temperature, and a leak occurs, detectable vapours will not be produced. For example, gas detectors are not recommended for the detection of diesel vapours because the flashpoint is high (62°Centigrade) with respect to normal ambient temperatures. A diesel storage area will not use gas detection; instead the hazard mitigation plan would normally rely on flame detection, because diesel would reach its flash point only from a rogue heat source.

Understanding the principle of vapour density of gas is important. Vapour density is the weight of vapour or gas per unit volume, compared to the weight of same volume of air at a given temperature and pressure. Vapour density indicates whether a gas is heavier or lighter than air. Air has a given vapour density of one. If a container releases methane (vapour density of .55) into air, the methane gas will rise. If a container releases propane (vapour density of 1.56) into air, the propane gas will sink. Knowing the vapour density helps to determine whether the gas detector should be mounted above or below the possible leak source.

Environmental conditions, such as air movement, temperature, and the type of leak, can affect dispersion pressure and therefore can affect the number of gas detectors. Environmental conditions can make gas releases unpredictable and multiple detectors may have to be used to ensure 100% protection and continuous monitoring of the area. It is important to note that no guidelines or standards are published to indicate the volume or area size to be protected by a fixed gas detector.

Third-Party certifications to standards

Industry standards are set by entities such as the American National Institute/ American Petroleum Institute (ANSI/API), the International Society of Automation (ISA), and the National Fire Protection Association (NFPA). Recently, the NFPA added gas detection criteria to NFPA 72: 2010. These entities define many of the requirements for proper personnel protection.

As gas detection systems are designed, project management groups need to understand and follow these standards. Standards vary depending on area of the world. The International Electrotechnical Commission (IEC) sets standards for most countries outside of North America. These standards place varying importance on environment, performance, and risk factors — such as hazardous location, ingress protection, performance, and Safety Integrity Level (SIL).

Understanding the best practice for effective gas detection requires knowledge of the application as well as the properties of the gases or volatiles within the application.

- Hazardous location standards ensure that a device can survive and perform in a specific environment.
- Ingress protection defines how the device can stay protected from the environment as it operates.
- Performance testing verifies that the device will work as it is designed.
- SIL rating shows that devices working together will function as planned if a hazard is presented.

Legislation, insurance companies, and/or company policies require product approvals from authorized organizations throughout the world to maintain protection. In addition to their own testing, safety manufacturers call upon third-party testing agencies such as Factory Mutual (FM), Canadian Standards Association (CSA), Det Norske Veritas (DNV), and DEMKO to conduct unbiased testing of gas detectors and other products. The third-party testing is conducted by experts in the certification process to standards and best-testing procedures. The third-party companies then provide unbiased assurances to the end user that the products operate as the manufacture designed and specified.

Final thought

Understanding the best practice for effective gas detection requires knowledge of the application as well as the properties of the gases or volatiles within the application. This knowledge will help the hazard management team make the best decisions in determining what type of gas detector technology to use and where to place the detector to ensure detection in the event of a leak. IFP

Brian Quick is an Applications Engineer at Detector Electronics Corporation

For further information, go to www.safety.det-tronics.com


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Fire Glazing – System Specification and Best Practice

Simon Ellison

CGI International

Fire resistant glazing and its role in effective passive fire protection – Simon Ellison examines the importance of system specification and best practice techniques.

Fire glass is rated according to three main classifications: integrity only (E), integrity with radiation control (EW) and integrity with insulation (EI). As one of the earliest fire safety glazing products on the market, wired glass is still commonly used today for E rated applications. However, continued advances in fire glazing technology have led to the development of clear and thinner products that are able to provide the full range of protection – from integrity only, up to fully insulated, which restricts heat transfer through the glass to the unexposed face.

From a design perspective, the challenge is often to achieve vast glazed areas. However, fire glass is only certified for use up to the maximum sheet size at which it was tested. It is important therefore to realise that fire protection performance is not achieved exclusively by the glazing – it must be proven to perform as part of a system along with the frames and seals.

The importance of system specification

While specific testing procedures must be conducted in accordance with country legislation, best practice remains that the evidence/certificate should detail the glazing in application. For example, a test certificate should not only cover the fire glass, it should also confirm that the surrounding frame, seal and associated installation materials can withstand the same levels of fire integrity.

The testing of fire glass is always to maximum glazed size. However, in the context of system specifications, the importance lies in the detail of the complete construction. Any deviation from the specified materials, no matter how small they are deemed to be, will render testing certification invalid.

As such, at every point in the construction programme – from specification to installation – a critical factor to protect the integrity of fire protection performance is to ensure the system is being installed exactly as it is detailed. For example, where timber frames are being used, it is important to verify whether the beading tested as part of a system was hardwood or softwood, and if pins or screws were used. Although these might appear minor details, the difference between the fire performance of hardwood and softwood is significant.

As modern aesthetics demand the frame

profiles and bead sizes to be as small as possible, it is important to check the size of beading that has been tested. For example, a system may be approved with 25mm beading but the specifier may wish to detail 15mm. Under these circumstances the test evidence would not cover the system specification. This also relates to the frame orientation. If the system is tested with the bead to non-fire, then this is the only orientation that can be used under the test evidence.

Regarding fixing methods, pins are often preferred to screws as they offer a neater finish and are quicker to install. However, there is a danger that when exposed to fire, the pins could fall out more easily than screws and compromise the overall system integrity. It is therefore important to request full test evidence of pins performing in a fire rated glazing system. Where a fire rated system is being used with pins, it is recommended that they are pitched at 200mm centres.

Another particular detail of significance is the glazing media. Dependent on the application and performance requirements, sometimes inert media such as ceramic tape is specified and other times intumescent is required. While this might appear a small detail in the overall system construction, any change to the media could compromise integrity, which is why the fire glazing system must be designed and installed to the exact specification that was tested.

Understanding testing protocols

Globally, system specifications and the associated testing of these remain of utmost importance. However, the idiosyncrasies of testing protocols across countries and regions means that validated testing in one country may not necessarily deliver compliance in another.

A good example of this is in the UK, where fire testing is currently undertaken to British Standards (BS). In 2013, the country will be required to comply with European (EN) testing standards. In this instance the assumption is that if a fire glass product or glazing system has been shown to meet 30-minutes fire integrity and or insulation with BS, that it will achieve that against the new EN testing.

Due to the differences in testing procedures in Britain and Europe, this is not the case. Current fire testing protocol in the UK leaves the thermocouples in the testing furnace exposed. In contrast, EN testing techniques encase the thermo-couples in a ceramic and steel plate, which is intended to standardise heat detection across different types of furnace. Such standardisation should ultimately ensure more reliable test results and consistency of product performance throughout Europe. However, as it results in a more intense period of heat that was not present during BS testing, systems that currently achieve compliance may not reach the same integrity levels.

Due to the differences in testing procedures in Britain and Europe, this is not the case.

This example illustrates the importance of understanding the testing procedures that are undertaken between countries, particularly when exploring the potential for specifying fire glazing products from overseas.

Putting theory into practice

Pyroguard fire safety glazing has been installed at two new Royal Shakespeare Company (RSC) theatres in Stratford-upon-Avon. The much celebrated Royal Shakespeare and Swan Theatres have benefitted from high performance integrity and insulation glazing in fire doors throughout the development.

EI glazing was specified at 23mm and 15mm thicknesses to deliver 60/60 and 60/30 fire ratings respectively. Used as part of an internal fire door system, the product was required to deliver integrity and insulation performance for slim vision panels. The fire glazing challenge for this project was satisfying the UK building regulation requirements without compromising on the build schedule. Pyroguard met the necessary performance specification and could be delivered to site as bespoke cut sizes in a short space of time.

A new Extra Care development in Carlisle, UK, will benefit from superior levels of fire protection following the specification and installation of Pyroguard EI 30 INT – a high performance integrity and insulation glazing product.

The development at Heysham Gardens in Carlisle will provide 60 mixed tenure homes, principally for over 55's who require some social care but wish to remain independent in their own homes. To ensure compliance with the UK's Part B fire safety regulations, architects specified Pyroguard EI 30 INT, to ensure the required levels of fire protection could be achieved with screens in the communal area. Philip Brooks, of architects Day Cummins, explains: "Good day lighting and sightlines are key drivers on this Extra Care scheme. This can enhance visual recognition for those with failing eyesight or dementia, and can reduce reliance on artificial lighting. The fire glass helps to achieve these aims and ensures fire protection requirements are met."

The fire glass was also installed at fixed sidelight panels next to fire doors, including flat entrance doors. The size and weight of the panels demanded that Pyroguard be installed on-site. By delivering the glass to site cut to size, the contractor was able to efficiently construct the glazing system. IFP

Simon Ellison is Technical Manager for Pyroguard at CGI International

For further information, go to www.pyroguard.eu

Protected by the world's largest high-pressure water mist system and a host of other safety systems and devices, the A86 West tunnel in Paris is a model of tunnel safety

Vuolle Pasi

Marioff Corporation

New Era in Road Tunnel Safety

Tunnel fires pose not only a life safety threat for travellers, but can also cause severe damage to the tunnel including the concrete construction and mechanical and electrical systems.

In confined underground spaces such as road tunnels, fires are particularly dangerous because they can grow extremely quickly, generating very high temperatures and amplifying the dangers posed by fuel spills and toxic smoke. These phenomena can prevent emergency services from approaching a fire to fight it, and have led to several casualties in tunnel fires around the world.

Tunnels are traditionally protected against fire by passive safety measures. These include construction materials that inhibit the spread of fire and safety structures such as special escape tunnels, emergency exits to a neighbouring tunnel or to the surface, and spaces where people can find shelter. Passive safety measures contribute to underground safety in important ways, but can prove insufficient during major fires such as those that occurred in the Mont-Blanc, Tauern and St.Gotthard road tunnels.

In the search for solutions that better mitigate the threat of underground fire, experience drawn from fire testing and field installations shows that high-pressure water mist technology is an excellent solution for preventing direct and consequential damage to people, tunnel infrastructure and traffic. As a consequence, an increasing number of high-pressure water mist systems are being installed around the world to protect underground transportation infrastructure such as road tunnels. In this environment water mist systems attack the fire instantly upon activation, suppressing and controlling the fire before it can spread, with minimal amounts of water.

Water mist systems use plain water and are therefore environmentally safe. These systems use substantially less water than conventional deluge systems, a great advantage in underground environments where water supply and drainage can be problematic.

High-pressure water mist fights fire using three main mechanisms: cooling the fire itself and the air surrounding it; blocking the radiant heat; and displacing the oxygen. The small water droplets vaporise very quickly, absorbing heat very efficiently. At the same time, the water mist expands, displacing the oxygen at the seat of the fire. The water mist blocks effectively the radiant heat, preventing the fire from spreading or reigniting.

Typical of these systems is Marioff's HI-FOG watermist fire protection system that has been adopted for a number of underground facilities, and has type approvals for the system performance in these environments, granted by a number of leading authorities regulating tunnel safety.

High pressure water mist discharge

A86 West Tunnel in Paris

The A86 West tunnel in Paris, protected by a high-pressure water mist system, is probably the world's largest road tunnel protected by an active fire protection system. It is a feat of engineering and design at ten kilometres long with two superimposed levels, one in each direction. Each level has two traffic lanes and a hard shoulder. Reserved for light vehicles, the tunnel is equipped with all the latest safety devices, exceeding the requirements of new French regulations governing tunnel safety.

The importance of fire protection is magnified in this type of tunnel that is designed to carry very dense traffic. The ceilings are very low and it may be difficult to evacuate even small quantities of smoke. The heat given off by a fire will also quickly affect the low-lying ceiling equipment.

The Marioff water mist system provides front-line fire protection with a clear mission in case of fire. The system must reduce the ambient temperature, facilitating the evacuation of motorists to the emergency exits located at 200-metre intervals. It must also produce conditions for emergency services arriving on the scene to contain, control and extinguish the fire.

The A86 West water mist system carries out its mission with 24 spray heads in each coverage zone, each 33 meters long. Three zones are triggered simultaneously in order to cover an area about 100 meters long around the seat of a fire. Upon activation, the water mist rapidly absorbs heat, giving very effective cooling. They also greatly reduce the amount of smoke a fire gives off. This contributes to safe evacuation and saves lives during the first critical moments of a tunnel fire.

M30 Madrid Tunnel in Spain

The Madrid M30 project is the world's largest urban tunnel project, involving 99 km of new road construction, 56 km of which comprises tunnels. The project covers the redesign, rerouting and refurbishing of the inner ring road of the city of Madrid. Over a number of phases, the M30 project has been rerouting major sections of the road through new tunnels, freeing up surface areas for

HI-FOG spray head system installed in roundabouts in Helsinki service tunnel

redevelopment into green areas, footpaths, bicycle paths and new housing, while significantly reducing inter-city travel times.

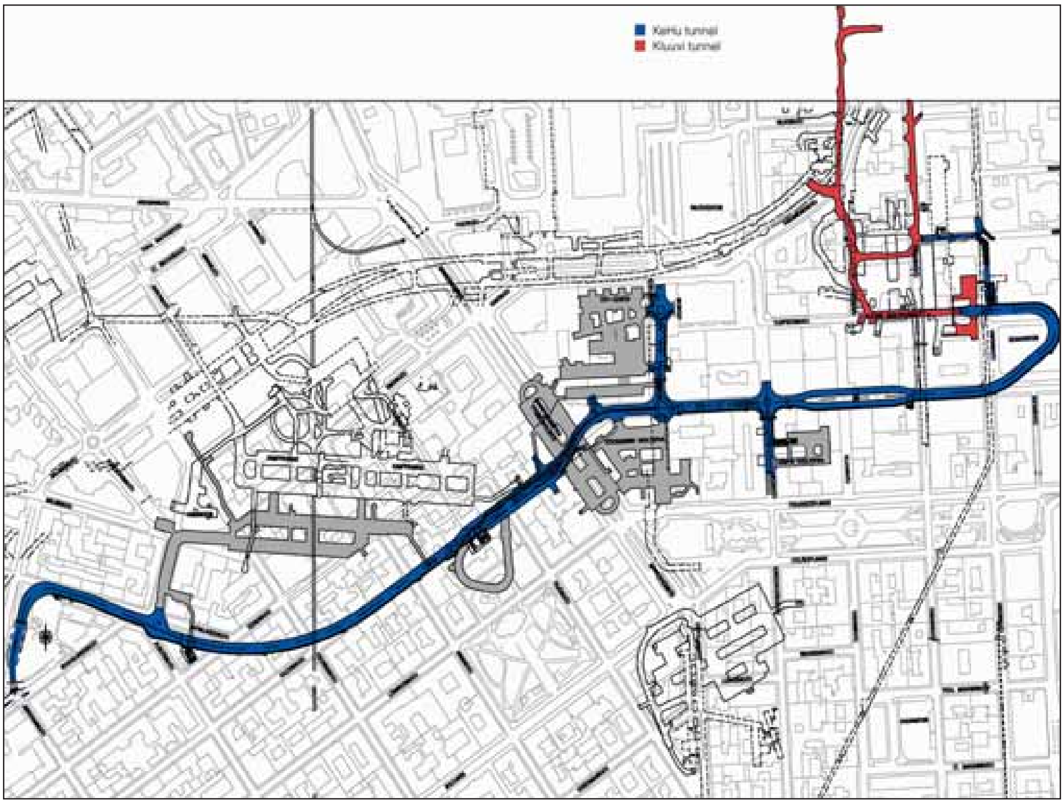
In the project planning phase, seven tunnel segments were identified as requiring an active fire protection system. A number of different water mist systems were subjected to full-scale fire testing, and the results convinced the road authority that it was possible to design and build a water mist system to handle the M30's extra-wide tunnel sections and potentially large fire loads from heavy goods vehicles while using modest amounts of water compared with traditional deluge systems. The seven tunnel segments designated as requiring active fire protection are now protected by water mist systems.

Helsinki Service Tunnel in Finland

The Helsinki service tunnel was built between 2007 and 2010, and is protected by Finland's first automatic tunnel fire protection system. The total length of the new tunnel is two kilometres, and is the main thoroughfare for trucks carrying supplies to stores and shops downtown. Getting delivery vehicles off the streets will have direct positive impact on city traffic and air quality. Furthermore, the tunnel gave large department stores new, modern and effective service and parking areas, while allowing old parking and service areas to be utilised as new retail space. All these improvements are expected to increase the desired attractiveness of stores and the city centre as a whole.

The tunnel is the most complex underground construction in Finland; the average height of the tunnel is 5.5 meters and the width varies from

HI-FOG spray head for tunnel fire protection, with assembly body and protective cap



HI-FOG spray head system is a part of the fully automatic fire protection system in Helsinki service tunnel, which runs straight under the city center

seven to 20 metres. It has two-way traffic, connections to several other infrastructure projects, and underground crossings including four roundabouts, all an average 30 metres to 40 meters below ground. It was a considerable technical challenge to implement the water mist system zone sizing. The design has to take into account the complexity of the tunnel, while maintaining the required performance together with the ventilation and fire detection systems.

The water mist system is designed to discharge simultaneously over two 25 metre long zones. The system flow rate is secured by three large pump units driven by diesel engines. The flow rate of each pump is 1200 litres-a-minute; two of which are required to operate simultaneously with the third for backup. The backup pump unit can be deployed to add flow rate, covering larger areas if needed. Water for the system pumps is supplied from two separate sources: a main city sprinkler feed; and a water reservoir located close to the high-pressure pumps.

Water mist's excellent cooling capability is considered to be an essential advantage. In tunnels, if there is no fire suppression system to provide cooling, fire fighters cannot get close enough to fight the fire effectively with fire hoses. Furthermore, experience gathered from full-scale tunnel fire tests showed that the velocity of the longitudinal ventilation during a water mist discharge can be less than when water mist is not being discharged. This helps the fire brigade approach the fire scene safely from the upstream side; they will not be impeded by a loss of visibility.

The climate in Finland can be extremely cold during the winter, so thermal protection is needed for the water mist system tubing. A trace heating system was installed for the main tubes exposed to low temperatures. Roads in Finland are also treated with salt to prevent icing during winter. All tubes and components are made of high-grade stainless steel in order to ensure the best protection against corrosion in aggressive tunnel environments. This will naturally prolong the life-time of the water mist system.

Two options were originally considered for protecting the tunnel: conventional sprinkler systems and water mist. The lower water consumption of water mist combined with its excellent heat and smoke suppression meant that there would be considerable savings in other systems. The drainage system could be more compact, the water supply and input/output channels smaller, the ventilation system could be smaller, and instead of multiple pump stations, a single, large pump station could serve the entire tunnel. The total amount of water needed for a conventional sprinkler system would have meant much larger tanks and water collection reservoirs. It also would have been very difficult for the city's water supply to feed a conventional sprinkler system. These are all clear cost-cutting benefit compared to conventional deluge systems.

In the final phase of the service tunnel project the 25-year-old Kluuvi tunnel was connected to the new tunnel. The old Kluuvi tunnel had an aging sprinkler system that was not dimensioned according to area discharge, but rather relied on traditional glass bulbs breaking. Fire in this old Kluuvi section was a major risk for the stores connected to the tunnel, some of which do not yet have modern fire doors. It was decided to extend the water mist system into the Kluuvi section to ensure that the entire tunnel has the same level of protection. The existing water mist system of the new tunnel was easy to extend to this old tunnel area using the same pump room.

System testing during the commissioning was carried out in order to ensure seamless interaction with other safety systems. Training of operating personnel and the local fire brigade were included in Marioff's turn-key delivery for the project. IFP

Vuolle Pasi is Manager, Tunnels Global Business Development at Marioff Corporation Oy

For further information, go to www.marioff.com

Peter Massingberd-Mundy

Xtralis

Open-Area Smoke Imaging Detection

Open-area Smoke Imaging Detection (OSID) technology was unveiled in October 2009. Following successful Beta trials during 2010 and UL approval in December 2010, the product was launched in the US. EU approval to EN54-12 is imminent.

Challenges to detection in open areas, such as stadiums, large atria, airports, stations, lobbies and warehouses have to date been addressed using line detectors using an optical light beam (known colloquially as "beams") or using aspirating smoke detectors (ASD). While specific risks can be detected using other technologies such as flame detection or video smoke detection, it remains the case that generic fire detection in large open area is most often provided by either beam or ASD technology.

This is principally because both technologies derive their smoke measurement over an area, not at a single location. Such integrated measurement is inherently better for detecting smoke, which is distributed and consequently diluted as it rises to high level or fills large volumes. Moreover both technologies have well established product standards (EN54-12 and EN54-20 respectively) and are included and recognised in most installation codes (such as BS 5839-1 and NFPA72). Thus they can be used with confidence and installed according to an established set of rules to provide "code compliant" smoke detection.

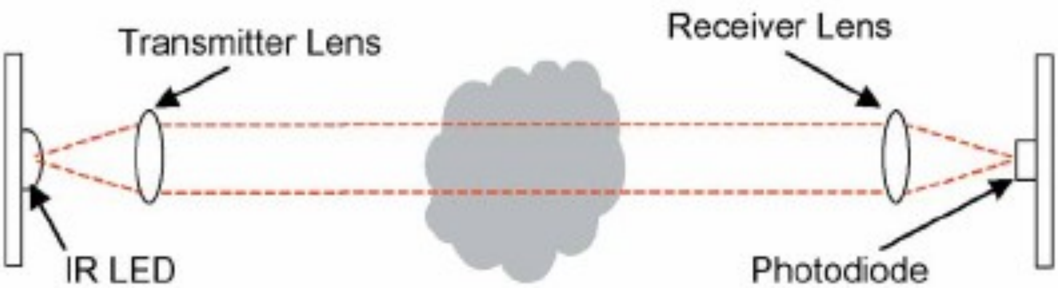
OSID is being approved as a beam detector to EN54-12, but it is not a simple beam detector.

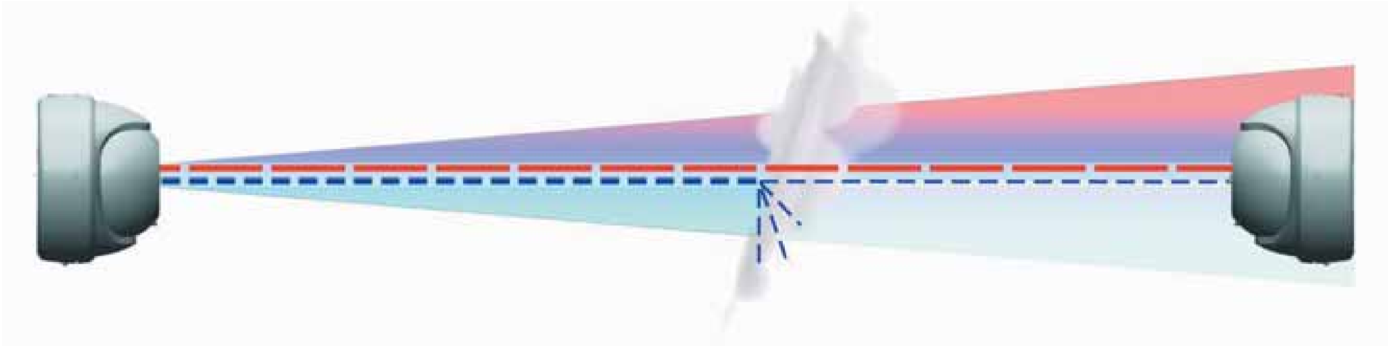
Simple beam detectors

Relating well to the human observation that a light gets dimmer when smoke obscures the view, the simple beam detector is arguably the easiest to understand of all the smoke sensors available. However, by measuring light attenuation (also known as extinction or obscuration) a beam detector cannot reach the level of stability and hence sensitivity of a light scattering detector, particularly over short distances. Thus beam detectors are not considered to be as capable of very early warning performance as technologies based on light scattering (such as most ASD systems). Put simply, this is because a scattering detector is measuring a large increase in a near-zero signal, whereas an extinction detector needs to resolve a small decrease in a big signal. This gives beams an inherently lower stability, higher noise reading and thus low sensitivity.

Nevertheless beam detectors, when applied correctly, can be surprisingly effective in many circumstances and can often signal an alarm earlier than point-type smoke detectors because of the integrating behaviour already mentioned. However, they do have some fundamental issues that have given them a poor reputation for

Beam detectors can be surprisingly effective and can often signal an alarm earlier than point-type smoke detectors. However, they do have some fundamental issues that have given them a poor reputation for reliability. OSID uses dual wavelength technology that overcomes the susceptibility to false alarms.





reliability. Consequently they are often used only when nothing else can be made to fit.

The perception of poor reliability for beam detectors is rooted in their proneness to false alarms and the challenges of achieving and maintaining alignment.

Propensity to false alarms

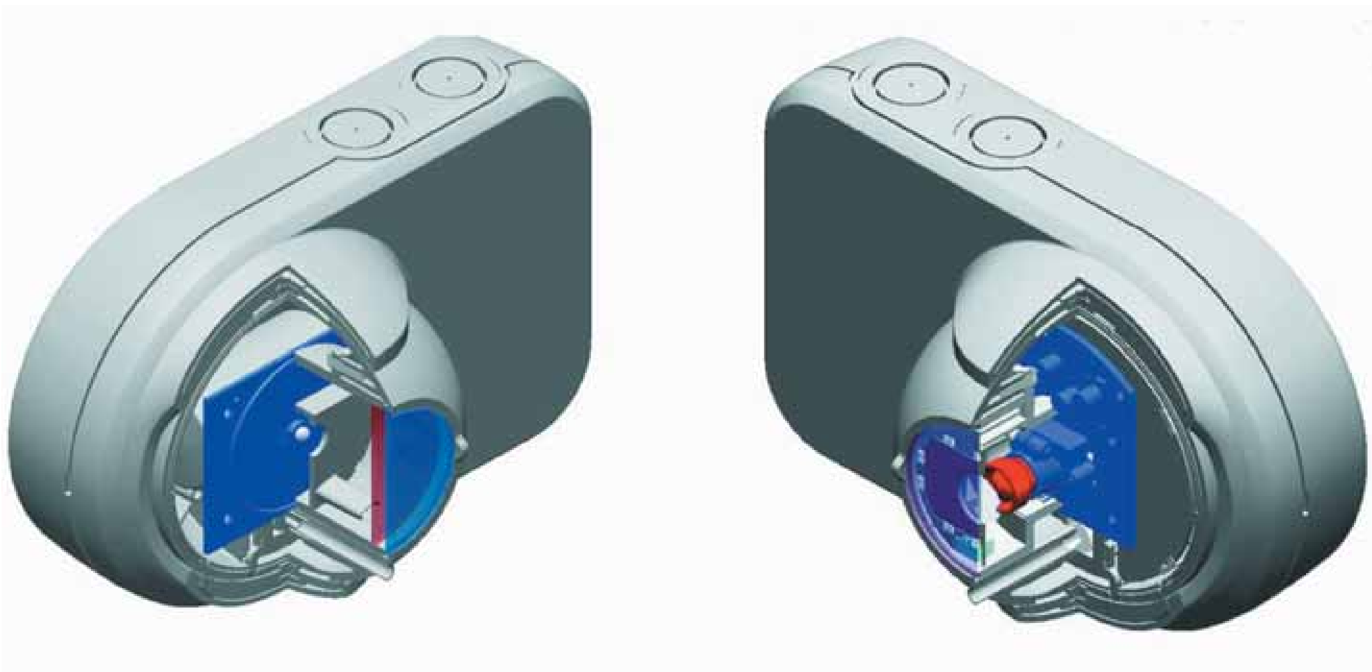
Because the beam detector is responding to attenuation of light between two points, anything that partially obscures the beam is potentially a trigger for a false alarm. For example, if an alarm is signalled when the attenuation is greater than 35% (that is, the light seen at the photodiode drops to 65% of what was observed with nothing in the beam), anything that causes an attenuation of 38% will result in an alarm. So, false alarms may be triggered by objects such as waving banners, balloons or even birds entering the beam path, or by dust in the air, or insects such as moths crawling on the optical surfaces of the transmitter, receiver or reflector. Consequently, beam detectors and false alarms are synonymous for many practitioners of fire detection.

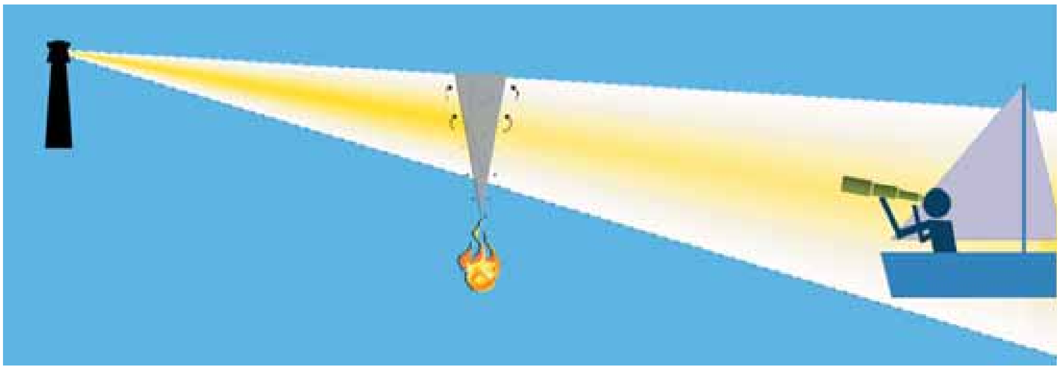
To overcome this susceptibility to false alarms, OSID uses dual wavelength technology. This technique is not new to those who keep up with developments in detector technology, but it has never before been applied to a beam detector. Fundamentally, while the attenuation of light by smoke or other particles is complex, there is a distinct difference between the attenuation of infrared (IR) light and ultra-violet (UV) light when particles are small, but this difference is not present for large particles or solid objects. By measuring the attenuation of these two wavelengths over time, OSID can differentiate between partial attenuation resulting from large dust particles (or intermittent intrusion by solid objects) and partial attenuation caused by smoke. This is what makes OSID so much less susceptible to the false alarm triggers commonly associated with beam detectors.

External influences

Measuring the light received from a distance light source sounds easy and would be if there were no other light sources. Unfortunately this is not the case, and so most beam detectors (including OSID) carefully arrange for the receiver to respond to a narrow band of light (typically IR because it is cheaper) that is matched to wavelength of their light source (or transmitter).

More sophisticated beams (including OSID) also modulate (flash) the light so that even if there are external influences in the frequency band of interest, they can be eliminated because they are not flashing at the expected rate and pattern.





A third effective technique used to ignore light from external influences is to focus the receiver to observe only the transmitter – rather like a sailor who uses a telescope to observe the flashing of a distant lighthouse. The disadvantage of this approach is that the telescope must be carefully and consistently aligned. Hence OSID does not use this technique.

Misalignment of the source

Before explaining how OSID overcomes the challenges associated with aligning the receiver of a traditional beam detector it is worth considering the consequences of misalignment of the transmitter. One can appreciate that the beam from a lighthouse is not consistent, being brightest at the centre of the beam and tailing off at the edges. If the beam was static and aligned to a distant ship, a sailor on that ship with his telescope observing the intensity of light received would find that the alignment of the beam to his ship has a significant effect on the intensity observed. In fact, the sailor would find it hard to be sure that a small fall off in intensity was due to smoke in the beam or movement of the distant lighthouse. However, if the lighthouse flashed alternately blue and red, and if the blue beam diminished more than the red, he could be more confident that it was smoke causing the reduced intensity.

To avoid the challenges associated with accurate alignment of the receiver, OSID uses imager technology . . . and further takes advantage of the wide viewing angle achieved by the Imager to allow for monitoring of multiple Emitters. As such, a single Imager can watch for smoke between itself and up to seven Emitters.

Achieving and maintaining alignment

To avoid the challenges associated with accurate alignment of the receiver, OSID uses imager technology. Essentially a wide-angle camera is used and the position of a red/blue flashing spot within the picture can be monitored. If the camera shifts, the spot can be tracked in much the same way as image stabilisation is achieved on modern digital cameras. What is particularly advantageous about this approach is that accurate alignment of the imager during commissioning is not necessary and subsequent shift in alignment can be tolerated and tracked. Thus OSID largely avoids the importance and challenges normally associated with aligning beam detectors.

Having made this point, it is important to note that alignment is still necessary during commissioning. After all, the lighthouse (Emitter) needs to shine towards the ship and the sailor (Imager) needs to be looking in the right direction too. To make this task as easy as possible, OSID is provided as a locking eye-ball. Using a simple laser screwdriver alignment tool, each eyeball is simply aimed and locked into position with a convenient one-handed operation; essential simplicity when working at height.

Multi-dimensional detection

To supplement its technological innovations, OSID takes advantage of the wide viewing angle achieved by the Imager to allow for monitoring of multiple Emitters. As such, a single Imager can watch for smoke between itself and up to seven Emitters positioned in multiple planes. To complete the package, the Emitters can be battery-powered so smoke detection over a huge area can be achieved by wiring to a single location.

Acceptable innovation

Never before has the potential and convenience of a beam detector been provided in such a reliable and innovative package. Innovations on this scale typically struggle to gain acceptance in the conservative and safety conscious fire industry but, as OSID is being approved to existing beam detector standards (such as EN54-12 in Europe), it can be used in full compliance with the installation rules for standard beam detectors. IFP

Peter Massingberd-Mundy is Technology and Expert Practices Manager at Xtralis

For further information, go to www.xtralis.com

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Fire Safety at French CCGT Power Plant

Horst Köhler

Siemens Building Technologies

Siemens Power Generation Group built a new gas-fired power plant at the site of the existing Emile Huchet power plant in the Lorraine region of north-eastern France. Central to the project was the provision of fire safety and security systems, recognising the pivotal role that power generation has to play in the modern world and the importance of ensuring business continuity in such critical infrastructure.

Construction of the turnkey project, valued at €360 millions, was originally awarded to Siemens Power Generation Group (SPG) by Spanish power company, Endesa, which had acquired the French electricity generation and sales company, La SNET (Société Nationale d'Electricité et de Thermique) in 2004. La SNET was then sold to the German group E.ON in 2008.

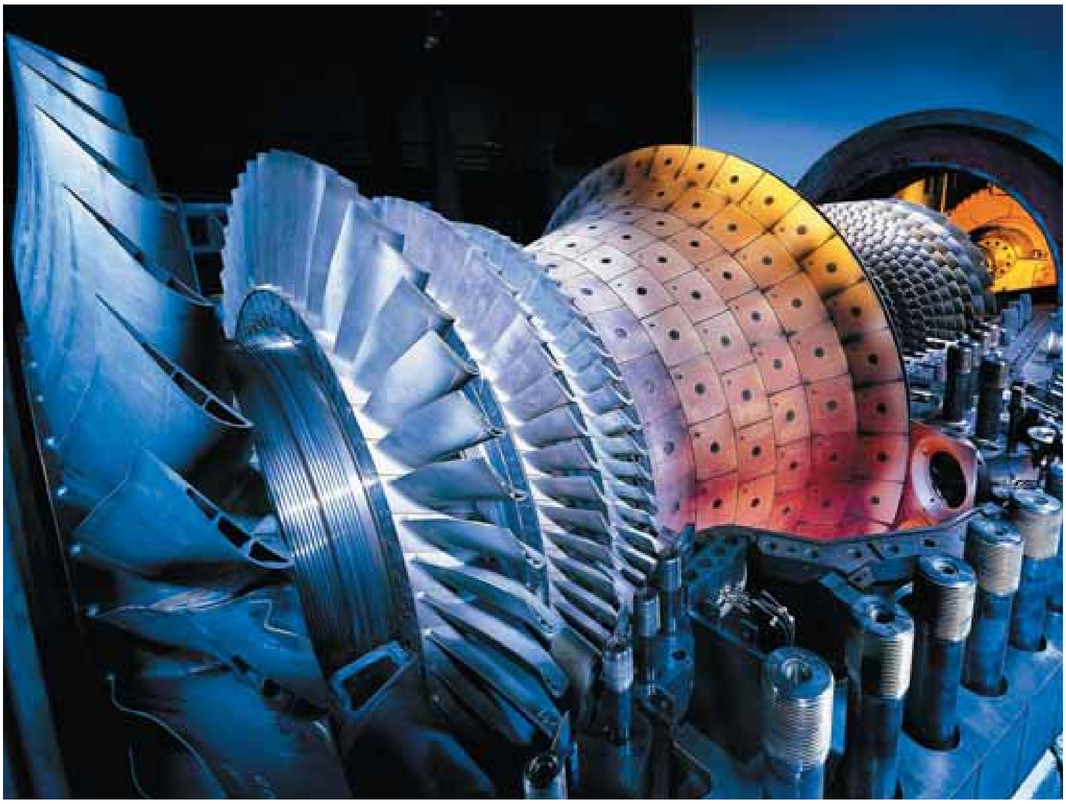
The original thermal coal fired plant operating today was built over 60 years ago on the 1.87 square kilometre site at Saint Avoid, and named after the great French mining engineer. Situated approximately twenty kilometres west of the German border near Saarbrücken and halfway between Metz and Sarrebruk, it occupies a strategic position at the heart of the European electrical networks.

With a combined output of 1086 megawatts, the plant currently comprises three thermal tranches, which have been continually upgraded with the latest technology available, thus establishing the Emile Huchet plant's reputation in the field of combustion of hard fuels and protection of the environment.

The two new combined cycle gas turbines (CCGTs) constructed alongside, were the first to be built by La SNET and are France's largest combined cycle facility to date. Each has an output capacity of 430 megawatts, giving a combined total sufficient to supply as many as one million households, and together increased the installed capacity of La SNET by 30%. They utilise natural gas and feature high cost-efficiency, flexibility and environmental compatibility.

Working together

Siemens has been operating in France for over 150 years and built the Emile Huchet power station with specialist help from CMI (Cockerill Maintenance and Ingénierie) Energy, the manufacturer of waste-heat boilers. The Belgian boiler-maker has a long history of designing and installing boilers for electrical power plants and industry.



Siemens's scope of supply encompassed the two gas turbines, two steam turbines and two generators as well as electrical systems and equipment, instrumentation and control systems and all mechanical equipment. Main civil works included building for the turbines and boilers, the cooling building, the administrative buildings and control rooms and all conducts and ancillary networks on site.

Supply continuity

Of vital importance and integral to Siemens' turnkey project at Emile Huchet, were the safety and security systems. That is because supply-reliability is now identified as a critical issue, requiring considerable investment of effort and resources in the planning, design and implementation of systems by all parties involved.

The changes in world politics as well as those in megatrend demographics – that is urbanisation, the increasing and ageing population and climate change – all pose specific challenges to Energy Security. Concerns regarding the impact of traditional methods of energy production on the climate are prompting efforts to improve overall efficiency of power plants. Against a background of increased risk of terrorist attack on critical infrastructure, and where fires represent 50% of losses in fossil fuelled power plants, these efforts are driving safety and security standards higher in order to keep the plants operating at maximum productivity while making minimum impact on the environment.

The best way of ensuring supply continuity is to make power generation, transmission and distribution as efficient as possible and by safeguarding facilities with high-performance, risk management systems based on the very latest, proven technologies available. Integrated solutions cover equipment monitoring, fire detection, extinguishing, security, surveillance, access, intrusion, evacuation, energy, lighting, building management and comfort systems.

The best way of ensuring supply continuity is to make power generation, transmission and distribution as efficient as possible and by safeguarding facilities with high-performance, risk management systems based on the very latest, proven technologies available.

At Emile Huchet, Siemens helped address these challenges via a complete offering in the fields of fire safety, security and building automation. With field devices and integrated systems and solutions, the facility's operators manage their risks better and respond to incidents more efficiently and effectively. Because, in doing so, they can optimise process efficiency, improve business continuity and safeguard supply reliability.

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and/or short circuits. A fire could then typically occur following a long period of overheating and smouldering erupting into flames. On the Emile Huchet site, Sinteso S-line detectors are installed to provide the very earliest, essential "aspirating" detection of smoke. Through "advanced signal analysis" they offer detection accuracy and rapid notification through signal evaluation, even under the difficult detection conditions caused by frequent deceptive environmental phenomena such as dust, steam or welding fumes that occur on parts of the site.

There is also the potential for the site to upgrade to the video fire controller, which can be connected to the fire detection loop for visual verification of any alarm situation. In addition to a network of detectors and alarm sounders, there are hard-wired command points and manual extinguishing units for particularly vulnerable areas.

For extinguishing purposes, there are thirteen fire hydrants at strategic locations around the perimeter of the site connected to a 2,500-metre ring-main system and a large water tank with back-up connection to the existing water main. The tank holds 750 cubic meters of water reserves – sufficient to meet the demand of any outbreak by providing 120 minutes' supply to the generators. The pump room houses a timed electric pump, a diesel pump (in case of large fire incidents) and a jockey pump to maintain a fixed pressure of 9 bar in the main ring system. There are fifteen indoor fire hydrants, again strategically located in various buildings around the site. All of the extinguishing measures were developed in consultation with the local fire service to ensure that, in the event of a fire, they have the optimum means to tackle it.

The main control room, the transformer station and other small transformer buildings are protected by fire detection and Siemens' Sinorix gaseous "deluge" extinguishing systems. Sinorix extinguishes flames without harming people, assets or the environment, safely and reliably. It does so by utilising innovative technology such as CDT (constant discharge technology) or the combined gas/water Sinorix H_2O. Constant discharge technology is based on using natural agents under controlled and constant gas discharge – that allows a reduction of overpressure flaps by up to 70% – to extinguish fire. Sinorix H_2O Gas is an efficient extinguishing solution for protection of the power supply rooms through the combined advantageous use of nitrogen and water. Nitrogen displaces the oxygen and the water mist lowers the ambient temperature, resulting in reliable extinguishing and effective prevention of re-ignition. The system is individually tailored to bring the exact amount of water for the specific risk of fire.

Each main turbine building has its own dedicated XC10 fire extinguishing panel and the large open areas of the turbine hall are protected by a spray-deluge, sprinkler system, which is capable of delivering 4,000 litres of extinguishing agent a minute. The areas of the turbine building in which oil is used, such as the pump and motor stations, are covered by a system of foam/water mix. All cabling is carried out in anti-smoke pairs ("low smoke" and "fume") and all cableways are also protected by detector and sprinkler systems.

Along with systems giving the earliest possible, reliable, error-free detection, alarm notification and the activation of pre-programmed control functions, fast and effective evacuation can be covered by the integrated solution. Pre-defined configurations of Siemens' E100 voice system allows the appropriate announcements to be made in an evacuation scenario depending on the situation, the risk and pre-determined, phased evacuation schemes.

Full integration

There is also the potential to fully integrate the fire system with the site's other electronic systems (security, energy and building management) via a central management system – Siemens' M8000 Danger Management Station. This allows for the control room operators to monitor actual alarms, system faults, security breaches and equipment failures. It also creates an "early warning" system through the creation of fault detection diagnostics (FDD) based on historical data, to pinpoint potential problems with plant and equipment.

The plant went into production in early 2010 (after a rapid construction period of only 30 months) to help meet peak and intermediate load needs that have been increasing since full deregulation of the French market in 2007. IFP

Horst Köhler is Head of Utilities Solutions at Siemens Building Technologies

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DX1090	Nonionic	●	●	●	●
DX1025*	Anionic	●	●	–	–
DX1026*	Anionic	●	●	●	●
Foam Stabilizers					
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DX5065**	Anionic	–	●	–	–
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The International Commerce Centre (ICC) is Hong Kong's tallest building

ASD: Relative or Fixed Sensitivity?

Simon Whittall

AirSense Technology

Fire prevention is a fundamental focus in any fire safety engineering scenario. While ensuring provision is in place to respond to and recover from a fire should it occur, preventing it happening in the first place is, quite rightly, the prime objective.

A critical part of the fire prevention process is time. It is perhaps a simplistic statement but one worth making nonetheless, that the quicker a fire can be detected, the sooner action can be taken to extinguish it; the quicker evacuation can, if required, be arranged and the less damage will be caused. This has lead to the widespread adoption of aspirating smoke detection (ASD) systems, which are designed specifically to detect fires in the early incipient stage.

To achieve this early warning, laser-based ASD can be up to a thousand times more sensitive than a point detection system, or other aspirating systems that employ a 'point' type detector in an aspirating enclosure. However, this has lead to concerns that they are potentially too sensitive and, with fire safety engineers and fire services throughout the world looking at how to reduce the incidences of false alarms, this balancing of early detection with minimising false alarms remains a challenge.

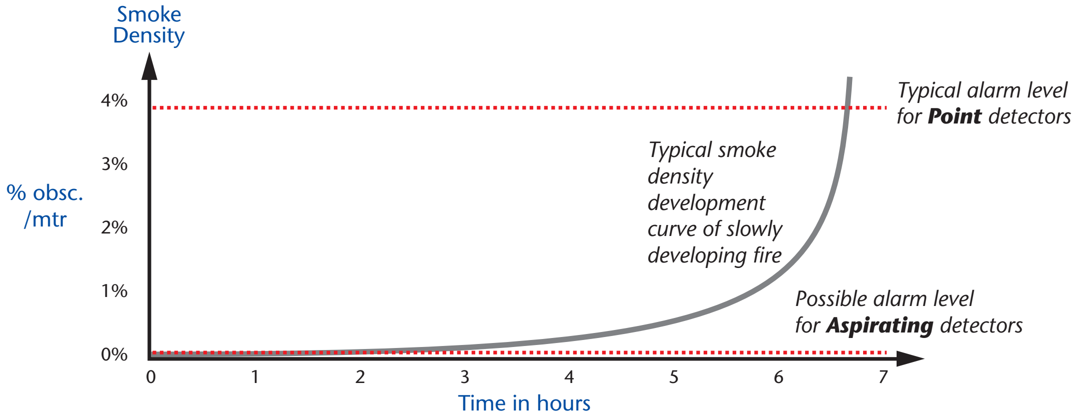
It is this challenge that brought about the development of relative sensitivity ASD systems as an alternative to the fixed sensitivity approach. Relative sensitivity is based on a concept whereby the detectors 'learn' from the environment in which they are operating, and continuously maintain an appropriate level of sensitivity. Fluctuations in the environmental smoke density are not uncommon and can be caused by a number of factors, from changes in building occupancy levels and manufacturing processes through to variations in a building's air-conditioning filtration systems. Such variations and fluctuations are relatively minor in terms of the impact on the environment in human terms but, in the context of ASD, which is based on the detection of microscopic particles of smoke, they certainly are significant.

Fixed sensitivity

In fixed sensitivity ASD systems, the detection device produces an alarm output when the measured smoke density in the protected area reaches a predetermined level (see Figure 1). The detector provides a measure of smoke density, usually by detecting scattered light from a high intensity light source, within an internal detection chamber. The amount of scattered light is approximately proportional to the smoke density, with such systems typically having multiple alarm thresholds located at points along a moving 'bar-graph' output scale. The major drawback with this fixed sensitivity technology is that the bar-graph starts at a measurement of zero percent obscuration per metre; that is, absolutely clean air.

This really occurs only in clean-room environments or specialist laboratories, which is why initially ASD was largely confined to such specific applications.

Figure 1



However, as the benefits of early detection have been recognised and a much wider range of other building types and processes have sought to employ the technology – the so called 'real world' environments – the smoke detected by fixed sensitivity detectors must always include a degree of contamination caused by natural processes or shortcomings in the ventilation employed within the protected area. In these 'normal' applications, a fluctuating background of ambient smoke density will inevitably be present that will impact on the performance of fixed sensitivity devices.

When a fixed sensitivity detector activates, it does so because the combined values of ambient smoke and smoke produced by a fire has reached the fixed alarm level (see Figure 2*)*. The illustration demonstrates that at two different periods of time (indicated as A and B), the detector will generate an alarm with significantly different density of smoke present (S2 and S2). It also illustrates that, in displaying the sensitivity level at which the detector is supposedly operating, the information has little value because it is displaying the combined smoke densities (alarm value equals S1 plus S2). With no way of knowing what the ambient level will be normally, the fixed sensitivity technology has no way of accurately knowing the density of smoke produced by a fire. Herein lies the great sensitivity paradox – fixed sensitivity detectors in reality produce variable sensitivity/performance to fires.

Relative sensitivity

In a relative sensitivity approach to ASD, as already alluded to, the detector adapts itself to suit the environment in which it is located. Using perceptive artificial intelligence (AI) technology, the alarm thresholds provided are 'relative' to the smoke density of the specific environment being protected, rather than the arbitrary zero point used in fixed sensitivity systems. The relative scaling of the alarm threshold (see Figure 3) means that the increase in smoke required to activate a fire alarm at level S2 is the same, despite the environment having a variable ambient smoke density.

Those who argue against the relative sensitivity approach suggest that a system capable of 'learning' about increases in smoke density will de-sensitise itself to the point where it will not provide early warning – the very reason for selecting ASD in the first place. However, this is not the case. Perceptive AI software 'learns' at a much slower rate than any slow-growth fire scenario. In the event of a fire, smoke density increase in a building is near to exponential, whereas the learning ability of the software is linear; a point recognised by the European Standard EN54-20 that defines fire growth learning limits. Also, the learning process is ongoing and automatic, thereby maintaining the alarm level considerably closer to the 'normal' area smoke density than the fixed system and therefore potentially providing substantially earlier warning,

ASD systems are now employed in a very wide range of applications, from the telecoms and clean rooms for which they were first developed, right through to heavily industrialised environments. In addition to the advances in relative sensitivity already outlined that have helped make ASD systems more robust, unlike conventional detectors, ASD systems do not need to be located within the area to be protected. The air sampling pipes that draw the air through to the detector can be installed within areas subject to extremes of heat, cold and/or humidity, transporting the air to the ASD detector located outside of the area. ASD is therefore now widely used in cold stores, food preparation areas, textile dying areas and tobacco plants.

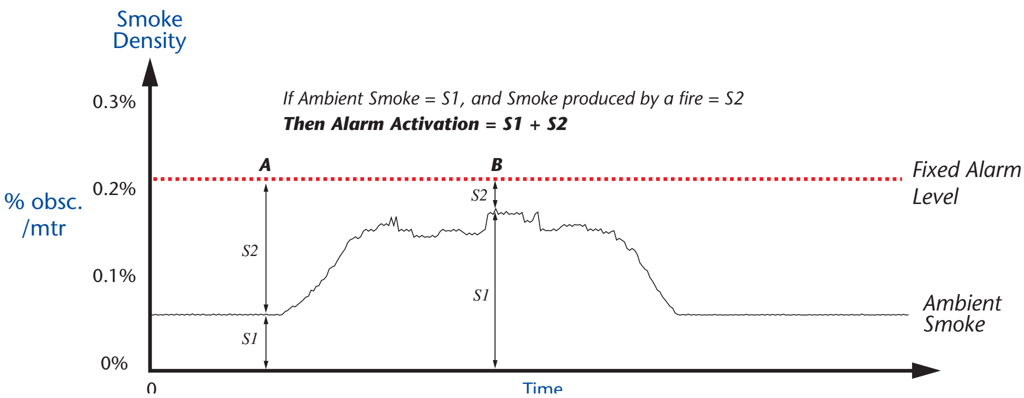


Figure 2

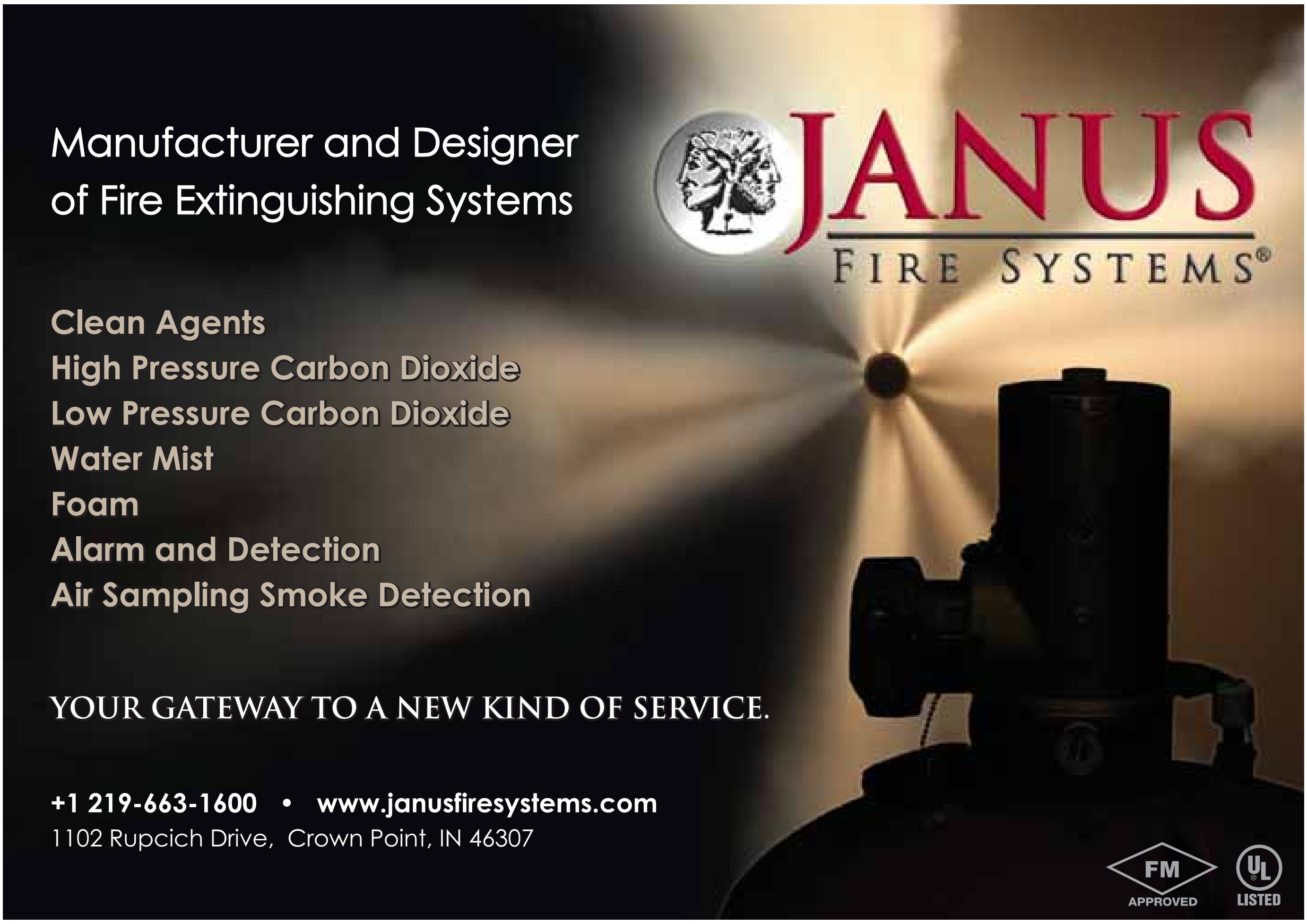

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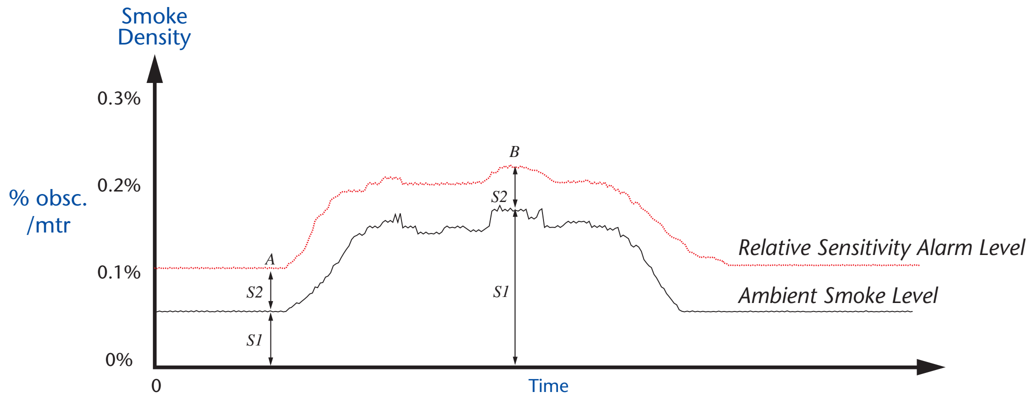
Figure 3



ASD in action

The use of ASD in general business environments has also increased significantly, particularly in office blocks characterised by large open atria in the entrance areas. This can cause particular problems for conventional point or beam detectors, as smoke from small fires lacks sufficient thermal buoyancy to reach the detectors and therefore trigger an alarm. This 'smoke stratification' affects buildings with ceiling heights in excess of 12 metres and can render point detectors ineffective, unless the fire has reached the conflagration stage.

A project in Hong Kong demonstrates how a relative sensitivity based system has been used in just such an application. The International Commerce Centre (ICC) is Hong Kong's tallest building. Standing at 118-floors and 484-metres, it is the centrepiece of Union Square at the multi-million-pound MTR Kowloon Station Development. The fourth-tallest building in the world, it boasts a seven-star Ritz hotel at its summit, 232,000 square metres of offices, 93,000 square metres of apartments, and a 93,000 square metre shopping mall at its core.

For this project a report was prepared using fire safety engineering principles to compare a sprinklered approach to one employing ASD. By using ASD, the report concluded that in the ICC, a saving of 2.7 minutes could be made in detection time. By also adopting an information-based warning system, featuring pre-recorded and live messaging rather than a simple tone based system, a further saving of two minutes was estimated in evacuation time. The combination of these two technologies (a time saving in the evacuation process of over 4.5 minutes) and the benefits they brought in enabling occupants to make an orderly evacuation, led to the selection of the ASD-based approach rather than an automatic sprinkler system. The fire engineering consultants on the project responsible for the report was Arup and Dr Mingchun Luo, Director of Consulting at Arup, commented: "The smoke detection system for the office floors can give an earlier warning of fire than a conventional automatic sprinkler system. Consequently, the occupants will be alerted earlier in the event of a fire, saving all important time in the evacuation process."

AirSense's Stratos-HSSD ASD system was selected to protect more than two-thirds of the ICC, including the building's atria – large open volumes with extremely high ceilings. The system overcomes the problem of smoke stratification by allowing strategic positioning of detectors and sampling points. The integrated perceptive artificial intelligence technology eliminates the occurrence of false alarms from the detectors by automatically maintaining multiple-staged alarms if smoke density exceeds statistically determined limits.

The report by Arup also recognised the benefits of ASD in terms of protecting unoccupied areas of the building. While in an occupied room, a fire would be expected to be detected by the occupants and dealt with accordingly, the critical case identified in the ICC was to protect against a fire originating in an unoccupied sector.

The risk assessment concluded that, in a sprinklered approach, a fire in an unoccupied office area would be likely to remain undetected for some time. Occupants located in other areas of the building would only become aware once a fire had developed to a significant size, probably at a point when the sprinklers had been activated and so helping to control the fire but where significant amounts of smoke were being generated and damage to the building was already occurring. The early detection provided by ASD was deemed the more appropriate route to take, providing a solution equivalent to, or better than, the level of fire safety achievable through a prescriptive design. This also offered significant cost savings in the overall structural fire safety requirements of the building.

At twice the size of London's Canary Wharf, Union Square is one of the largest developments in the world. Designed as Hong Kong's 'gateway to the world', the project offers unrivalled access to the mainland, is only 20 minutes by rail from Hong Kong International Airport, and features a convenient in-town check-in facility. Union Square is also at the heart of a system of main roads, ferry crossings and rail links. As the project's focal point, the ICC features an observation platform on its 100th floor.

More than detection

Aspirating smoke detection is no longer a new technology. It has been tried and tested in many varied applications. The advent of relative sensitivity based systems brought with it this potential for much wider usage and, although it continues to be widely employed in the IT and telecommunications environments for which it was originally developed, it is now seen in a whole host of situations, from heritage buildings and retail complexes to waste recycling facilities and flour mills. The fact that ASD provides such an early warning at the incipient stages of a fire means that it can effectively be viewed as preventing rather than merely detecting a fire, which brings us back to where we started, namely that fire prevention is the ultimate goal in protecting people, buildings and the environment from the threat of fire. IFP

Simon Whittall is Sales Director at AirSense Technology

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Emergency Shelters in Multi-story Buildings

Charles Q. Su

Petroleum Institute UAE

The rapid increase in the number of casualties caused by building fires in recent years must be addressed in building design and construction. One contributing solution is a new design concept, converting toilets and bathrooms into protective emergency shelters.

During the past few decades, the knowledge of how to build to reduce the hazards of fire kept pace with the rapid increase of the number of tall buildings in urban areas. Fire hazards often occur in congested areas, where large quantities of combustible goods are manufactured and stored, and where people tend to crowd. The main causes may be the failure of owners and managers of buildings to assume responsibility for the safety of the occupants, the wilful disregard or ignorance of the fundamentals of fire protection and the inadequacy of facilities provided for fire extinguishment and protection. Another cause may be terrorist attacks such as the September 11 event at the World Trade Centre in New York.

People die in a building fire due mainly to three effects: the poisonous smoke; heat and flame; and falling building materials. Important though the best-equipped public firefighting team is, the proper degree of life protection requires that effective means of fire extinguishing is provided, along with special building structures, such as fire walls and fire resistant barriers. This special fire protection area works as a protective emergency shelter and may save hundreds of lives in a high-rise building in an unpredictable fire disaster.

Building design and construction

Building design and construction play an important role in fire prevention and protection, and it has been recognised for some time that fire safety begins in the designer's office. In the current advanced building design practice, any deficiency in safety precautions should be prevented. The designer should be acquainted with the existing code requirements. However, statistical data shows the major losses of life by fire have occurred due to the falling short of required standards in one or more respects.

The principles of building design for fire safety may consist of

- Minimising the chance of fire starting in the first instance and spreading beyond its origin.
- Providing sufficient and adequate exit ways for occupants to quickly and safely evacuate.
- Provision for early detecting and alarming of fires.
- Equipment and necessary facilities for effective fire extinguishing.
- Provision of protective emergency shelters (PES) to protect building occupants from heat, smoke and noxious gases.

Although most of these principles are followed by building designers, the last has not received enough attention. So far, most building designers do not specifically provide PES for the protection of occupants. Some buildings provide barriers to the spread of fire horizontally and vertically, and rooms, partitions and self-closing doors made from fire resistant materials with air tight design may be provided depending on the nature of the occupancy and use. However, these measures sometime are not taken because of the costs and the effect to the total design requirements. In addition, openings and ventilation in such enclosures must be provided otherwise many lives may be lost by asphyxiation.

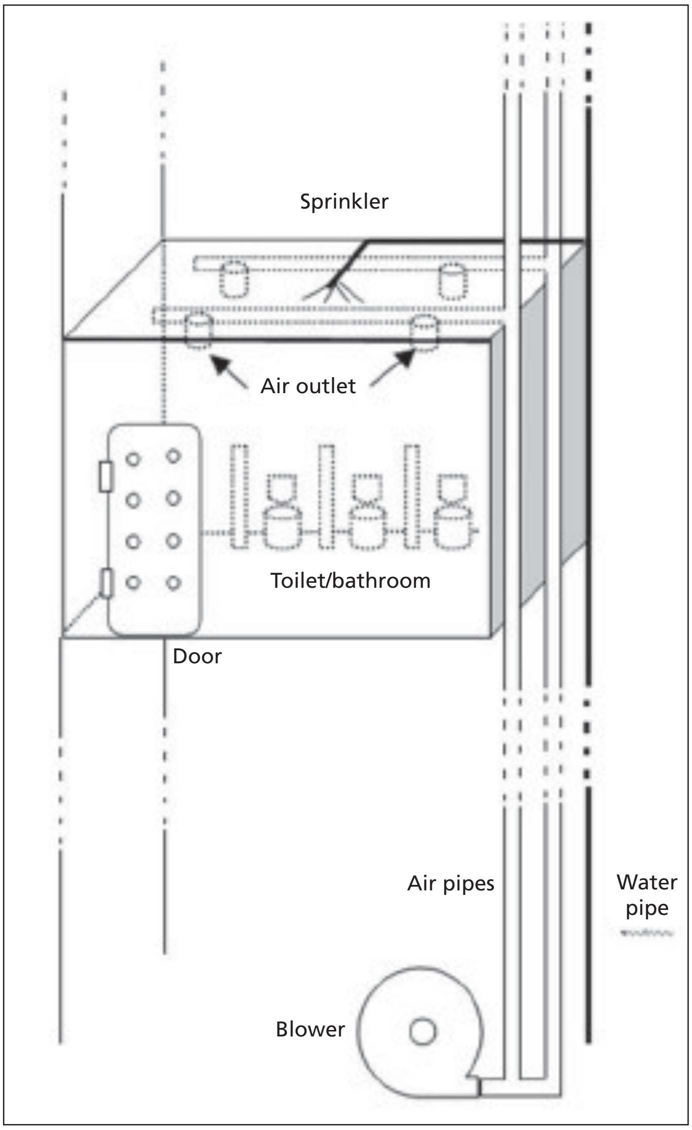
Protective emergency shelters

With modern and effective firefighting facilities and teams, most fires in a residential or office building can be extinguished within a few hours. However, under the conditions of fire heat, smoke and noxious gases, people can die within a few minutes. It is therefore vital to provide PES for building occupants to hide in and await rescue. If such PES in a building can accommodate a certain number of persons with sufficient fresh air and a suitable temperature, isolated from the heat, smoke and noxious gases during a fire, they could survive until the fire is extinguished by firefighters.

Conversion of toilets and bathrooms into PES

Toilets and bathrooms are normally provided on each level of a building, but he existing design of washing rooms cannot provide protection against building fires. The conversion of a washing room into a shelter for fire protection requires the following to be maintained during a fire. It should:

1 Contain sufficient fresh air inside the room.
2 Retain a suitable temperature and thermal insulation.



3 Be isolate from the heat, smoke and noxious gases.

The diagram shows the shaft of toilets/bathrooms in a building that are converted into PES.

In the new design, the following devices are added to the toilets/bathrooms:

1 Vertical piles of 50mm to 100mm diameter are installed along the shaft for fresh air supply blown from the blowers on the ground floor. Multiple outlets of the pile are provided in the toilet/bathrooms on each floor.

In order to prevent smoke and fire from entering the PES, fire resistance doors are obviously important. Certain thermal insulation materials such as micro-porous insulation may be used in the doors.

2 Emergency water sprinklers are installed in the ceiling of each toilet/bathroom.

3 Blowers of sufficient power are permanently installed on the ground floor (or basement) or are brought in by firefighters.

With these devices in operation, an air pressure above 1 bar could be kept in the toilets/bathrooms, which would blow the heat, smoke and noxious gases out of the door. The temperature could, if necessary, be further reduced by water spray from the sprinklers.

In order to prevent smoke and fire from entering the PES, fire resistance doors are obviously important. Certain thermal insulation materials such as micro-porous insulation may be used in the doors. Another technique is to make a number of small holes on the doors so that the air driven by the blowers could produce sufficient pressure to blow the flames away from the PES. Also, fibre-reinforced polymers may be used efficiently and safely in strengthening and reinforcing concrete structures.

Fire emergency operation procedure

When fire starts in a building, building occupants may rush into toilets/bathrooms on each floor if there is no other way to escape from the building. An emergency power supply may be used to run the blowers or operated by diesel engines. The air pressure in the PES may be controlled manually by individual valves. If temperature continues to rise, sprinklers may be opened. With these devices running at full strength, the air inside the toilets/bathrooms could be kept fresh and cool for a few hours before the fire is extinguished.

Conclusions

It is believed that the new design concept to convert toilets/bathrooms into protective emergency shelters for fire protection in tall buildings is both practical and feasible.

Some cost may be added to the conventional building design, but it is worthwhile for tall buildings that may be occupied by hundreds of people during working hours. Other structures within a building could also be converted into PES, such as elevators, but the conversion and operation may be more complicated. The toilet/bathroom PES may be retrofitted to existing buildings, particularly those that contain quantities of combustible materials.

More investigation is needed to polish the PES concept and address some critical issues, such as the lateral resistance of the remaining building and the thermal strength of PES shafts. Nevertheless, it is suggested that the building design codes take into account the perceptions and fears of the general public when designing for all hazards by adding PES. IFP

Charles Q. Su is Professor and Chair of Research Committee at the Petroleum Institute UAE

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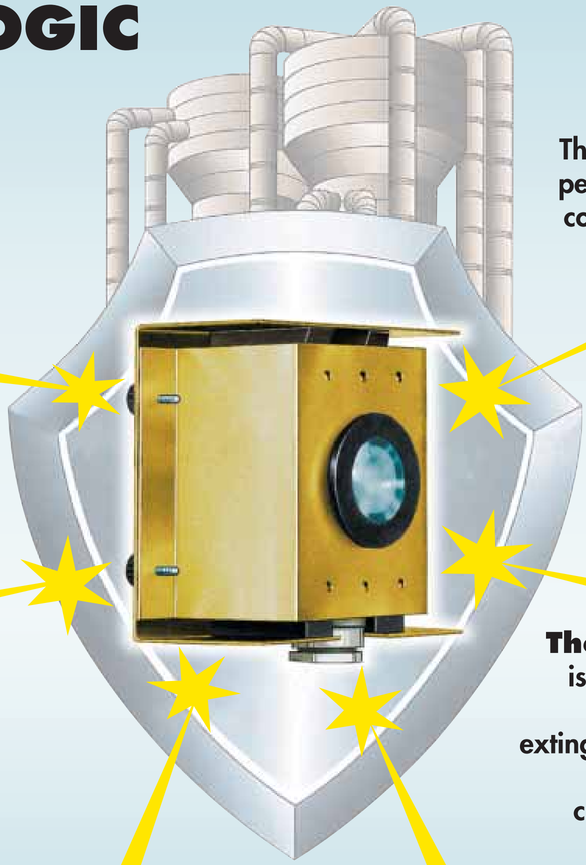

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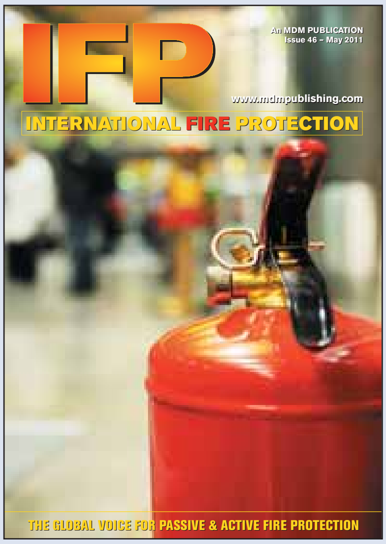

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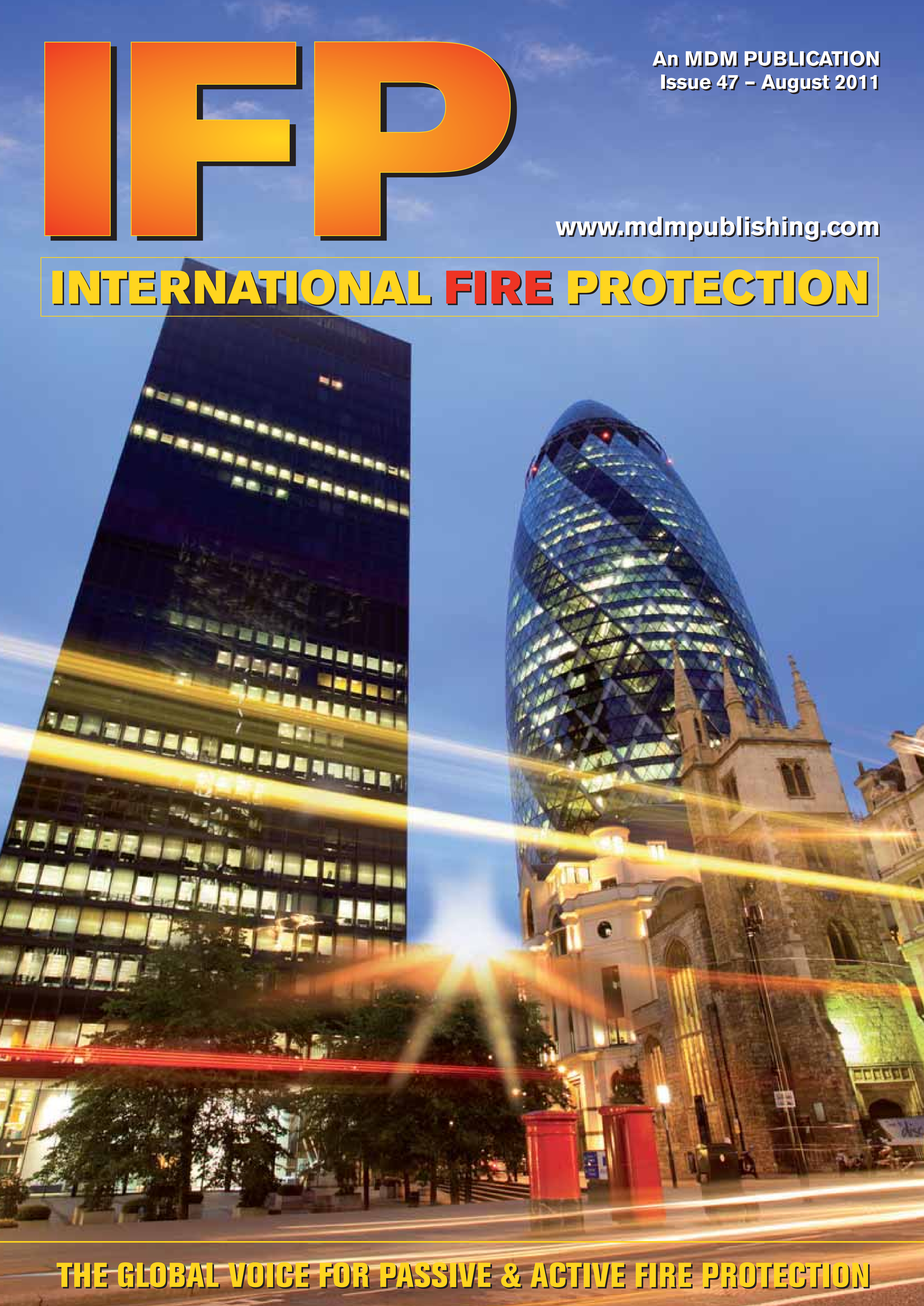

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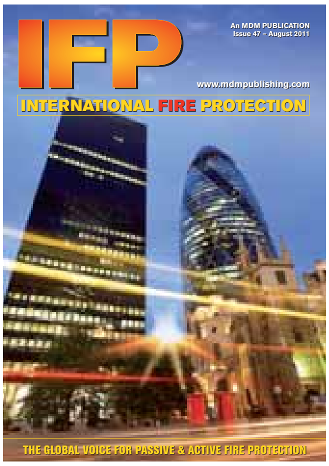
August 2011
Issue 47



Front cover picture: courtesy of Apollo Fire Detectors

Publishers
Mark Seton & David Staddon

Group Editor
Graham Collins

Editorial Contributors
Paul Frankland, Jennifer Woofter, Len Swantek, Allan Jowsey, Peter Lackey, Matthew Schumann, Rob Wakefield, Norman Macdonald, Neil Young, Niall Rowan, Steve Emery, Richard Bramham, Steven D. Wolin, Mark Harris, Harry Paviour

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Graham Collins

When Costs Are Cut, We All Pay

You would have to be exiled on a very remote desert island not to have picked up that there are again rumblings that dire financial times are once again on the global horizon powered, no doubt by the ailing Greek economy and the US deficit. This will undoubtedly have taken some by heart-dropping surprise as many nations, industries, companies and individuals would argue that, for them at least, the global financial crash of a couple of years ago is still reverberating noisily around their all-too-depleted coffers.

If these dire predictions come true (and, thankfully, they are not shared universally by financial pundits) we will undoubtedly be in for another round of spending belt tightening from which nobody is immune. In which case, detection and alarm and fire suppression system end users and consultants working on their behalf will, once again, be looking for ways and means of cutting costs with the focus firmly on achieving value for money.

Whole-life-cost is an argument that many suppliers will quite rightly use when proposing a solution. However, there are customers who see any investment in something they perceive as unnecessary (those with the "it will never happen to me" mentality) as a grudge purchase and will go for the lowest installation cost. Others, while supporting the whole-life-cost approach may argue that money is so tight that concerning themselves with cost implications years down the line is a luxury they cannot afford right now.

Of course, fire safety legislation, standards and codes of practice will still have to be met in terms of both what is installed and how it is maintained. But we will all have to keep open a very eagle-eye to ensure that the advances in life and property safety that have been achieved in recent years are not eroded. Take the UK as an instance. Despite the imposition of some fairly hefty fines being imposed for not complying with the country's Fire Safety Order, too many businesses are still flouting their legal responsibilities. It is too early to tell whether even the recent handing down of prison sentences will make any difference.

Significantly, one of the miscreants recently imprisoned was responsible for conducting a fire risk assessment that had glaring inaccuracies; an assessment that the local fire and rescue service described as "wholly inadequate". This case highlights the need to ensure that building owners and occupiers are using properly trained, experienced and qualified fire risk assessors, and not a "tame" assessor that is more interested in currying favour and hence gain more work from his client than he is about the safety of the building's occupants or protection of the structure. So much so, that system suppliers and installers might find themselves having to challenge an assessor's interpretation if they have reason to believe that corners are being cut.

Maintenance is another area that has the potential to fall victim to cost cutting, either by omitting to do it, delaying it for a month or two, or by not being too fussy about the credentials of the maintenance contractor just so long as the price is acceptable.

There is no disputing the wisdom of being financially prudent in tough, or potentially tough times, but we must not let it cloud our vision of what fire protection is all about – saving lives. And you cannot put a price on that. IFP

Seismic Approval for Watermist System

MARIOFF NORTH AMERICA announces that its Hi-Fog System with a SPU-6 sprinkler pump unit has passed a seismic qualifying test. The test demonstrated that the 3,400 kilogramme system can withstand the effects of an earthquake of up to 1G of force and continue operating.

The qualifying test for the system was performed by independent laboratories in Pittsburgh, USA that simulated an earthquake. The system consisting of spray heads, tubing, valves, the pump unit and all other material to be installed was mounted on a shaker table that exerted the 1G forces of a sustained quake. As a result of this test, Hi-Fog is expected to be installed at four nuclear power plants in Canada. The test data and documentation can also be used to demonstrate that the system is capable of operating in the northeast and midwest sections of the United States and select regions of Canada that experience earthquakes of up to 1G force.

For more information, go to www.marioff.com

Camera Technology Boosts Flame Detection

DRAEGER is claiming that its Flame 5000 explosion-proof, colour imaging based CCTV flame detector represents a significant development in flame detector technology. Designed as a stand-alone system and housed within a single unit, it combines colour imaging with digital signal processing and software algorithms to process live video images and interpret the characteristics of a flame. It is said to be ideal for use in oil and gas installations, as well as chemical and pharmaceuticals plants. It can also be used throughout industry wherever there is a potential fire source.

Unlike traditional radiation, or combined radiation and CCTV flame detectors, the Flame 5000 uses the camera to detect the flame and, Draeger says, can virtually eliminate false alarms. It can be used to provide live video images, or can be fully integrated with a control system or fire panel to provide fault and fire signalling using normal 0-20mA or relay outputs. As well as the surveillance benefits, this removes the need to despatch operators to investigate alarms, and reduces the risk of injury while improving response time to around four seconds.

It has a stainless steel mounting bracket that can be rotated to ensure optimum positioning, and the Flame 5000 can detect fires of 0.1 square metres or more, at 44 metres within a 90 degree horizontal field-of-view. An optical verification facility automatically checks the window for contamination and ensures that this field-of-view is not compromised by obstructions placed immediately in front of the detector. A built-in memory card allows the detector to record both before and after every alarm.

For more information, go to www. draeger.com

New Nozzle Boosts Performance

Improved nozzle coverage for its Sapphire clean-agent system has been announced by TYCO FIRE PROTECTION PRODUCTS that is said to increase extinguishant coverage in a simple, cost-effective way without impacting on fire suppression performance.

This recent enhancement provides one of the largest nozzle coverage areas of any UL/FM approved system employing Novec 1230. Each 360 degree nozzle now has a radial distance of 9.14 metres while the 180 degree nozzle gives a radial distance of 15.01 metres. The increased coverage is achieved while still providing the same level of fire protection.

The Sapphire system has been in use for more than eight years and was the first commercially available system to deliver 3M's Novec 1230 fire protection fluid, a clear, low-odour agent with zero ozone depletion that is safe for use in occupied areas.

For more information, go to www.tyco-fsbp.com

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Infrastructure Research Study Announced

SP TECHNICAL RESEARCH INSTITUTE in Sweden has announced a major research project into infrastructure fire protection, focusing on the protection of mass transit underground rail systems, including tunnels and subway stations.

The three-year project, called Metro, will study both fire and explosion hazards, and address a number of key aspects such as evacuation, rescue operations and smoke control. A series of small-scale, medium-scale and full-scale experiments will be undertaken as part of the project, and a seminar is being organised alongside the tests with speakers from such organisations as the Swedish Fire Protection Association, Transport for London and the Greater Stockholm Fire Brigade. It will take place between the 13th and 14th September 2011 at ENGgården, Brunskog in Sweden.

For more information, go to www.metroproject.se

Maltese Contracts

Two major contracts have been completed in Malta by HOCHIKI EUROPE. The Atrium, Malta's largest furniture store, and a new facility for the elderly operated by the CareMalta Group both now rely on Hochiki detection technology.

Together, the two projects used a wide range of Hochiki products, including heat sensors, mains relay controllers, door retainers, beacons, call points, sounders and sensor bases were installed in the Atrium, along with more than 485 of the company's optical smoke sensors.

For more information, go to www.hochikieurope.com

New Smoke Vent Control Call Points

KAC has introduced an orange-bodied version of the MCP indoor call point for use as a manual activation device in smoke control management systems that conforms to EN12101-9.

Typically, smoke vent activation is either electronically from the fire system control panel or manually from strategically located call points. For manual activation, KAC says that the orange body and clear marking, specified in EN12101-9, enables the function of the call point to be immediately identified, even by untrained personnel.

For more information, go to www.kac.co.uk

Seminar Success

Following what the company describes as "a highly successful event" FIRETRACE INTERNATIONAL is planning to follow-up its recent seminar on micro-environment fire suppression held in Riyadh, Saudi Arabia, with a second seminar.

More than 50 senior decision makers from civil defence, other government ministries, consultants and end users attended .

For more information, go to www.firetrace.com

SIEMENS

www.siemens.com/cerberus

Cerberus PRO – providing fast, reliable fire detection with patented technology

Reliable detection thanks to special **ASA***technology*™

Fast and reliable fire detection is essential to protect people and assets. The Cerberus® PRO detector range is the ideal solution – even if occasional deceptive phenomena occur. Because the detectors offer advanced signal processing and selectable parameter sets, they ensure very fast and highly reliable fire detection – even in the most demanding environments.

For sophisticated applications, Cerberus PRO offers ASA neural fire detectors. For standard applications, the multi-sensor fire detector, the smoke detector, and the heat detector are best choice. A broad range of special detectors – from linear smoke detectors, flame detectors to Ex detectors – rounds off the clever Cerberus PRO offering.

Answers for infrastructure.

Two New Detector Cerberus PRO Port

The addition of two new detectors from Siemens – again featuring the company's unique ASAtechnology (Advanced Signal Analysis) and selectable parameter sets – means the comprehensive Cerberus PRO portfolio has been expanded.

Cerberus PRO from Siemens is the powerful yet straightforward fire protection system, whose wide range of products provides innovative technology with extensive safety features. It is distributed exclusively by a network of approved Siemens Solutions Partners, who are trained to design, supply, install, commission and maintain the CerberusPRO products, without direct intervention by Siemens. Just like the existing range, the new detectors again ensure very fast and highly reliable fire detection, alarm signalling, and control, even in the most demanding environments. The advanced signal processing of ASAtechnology, combined with the detectors' selectable parameter sets, ensures accurate detection of the fire criteria – smoke, heat and now, carbon monoxide. This ensures the maximum protection of people and property, while minimising the possibility of false alarm.

The new ASA neural fire detector (OOH740) and ASA neural fire and CO detector (OOHC740) both have the capability of earliest detection of flaming fires caused by the combustion of liquid and solid matters. They are especially suited to exacting applications such as data centres, IT and telecommunications equipment, hospitals and nursing homes, restaurants, canteens and kitchens, car repair shops and garages and industrial production facilities. Or, in fact, any other environment where absolute safety without the distraction of unwanted alarms, is vital.

They are also immune to deceptive phenomena such as machine exhaust gases, industrial dust or steam. As a result, they eliminate unwanted alarms that otherwise would cause unnecessary and costly interruptions and delays. The new carbon monoxide sensor ensures earliest detection of all CO-generating fires. It can detect the gas independently from fire thanks to its autonomous carbon monoxide alarm channel. Moreover, the carbon monoxide parameter sets, which comply with Life Safety norms, can be set separately from the ASA parameter sets.

Clever Detection Technology

Both detectors contain two optical sensors with forward and backward scattering, as well as two thermal sensors. This means that they can be used as multi-sensor fire detectors, smoke detectors or heat detectors. At the core of the detectors are preprogrammed ASA parameter sets. From highly sensitive to very robust, it is possible to select the parameter set that meets the anticipated environmental conditions of each individual detection area.

In operation, the signals recorded by the sensor are converted into mathematical components using algorithms and compared with preprogrammed values. With the selection of an ASA parameter set, the algorithms can be influenced and the fire detector set to the expected influences and individual risks. The optimal parameter set is selected, taking the individual risks and the

s Added to folio

detector's immediate environment into account. Interpretation of the situation in real time results in the selected ASA parameter set being dynamically adapted. This automatically shifts its optimum application range. Consequently, the detector reacts more sensitively in the event of a fire and more forcefully in response to deceptive phenomena. The result is unique fire detection with unprecedented reliability against such deceptive conditions. It also offers real flexibility if usage of any area changes, the existing detector can be re-programmed with a new parameter set appropriate to its new operating conditions.

A Broad Portfolio with Complementary Options

Cerberus PRO comprises different control panels, fire detectors, peripheral devices, and accessories – all of which have smart, unique safety features (such as built-in turbo isolators, degrade mode, standby functionality etc.). The system includes a broad range of detectors for any type of fire as well as for carbon monoxide concentrations. They are powered and communicate via the C-NET. The detector line-up is completed by specialist devices such as linear smoke detectors, aspirating smoke detectors as well as those for explosion-protected zones.

Linear smoke detectors are the ideal choice in areas with limited access such as high-bay warehouses or atria where 'point-type' detectors can be impractical. Cerberus PRO linear smoke detectors work on a reflection principle, which means that they only have to be connected at one end, saving on cabling and installation costs. Areas containing highly flammable materials, such as engine test beds or combustible stores, are better covered with flame detectors. The Cerberus PRO flame detector range includes both single channel IR for simple applications as well as 3-channel IR for areas with deceptive phenomena such as halogen lamps, bright sunlight or welding. Cerberus PRO naturally offers a selection of detectors and other peripheral devices that can be used to protect areas subject to explosion hazards such as oil refineries, flour mills or battery rooms. Aspirating smoke detectors are ideal for areas such as computer suites that require very high sensitivity, areas that have limited accessibility or complex structures such as high, automated storage facilities. With LaserFOCUS, an active air sampling smoke detector with display, which can be used for highest sensitivities down to 0.025%/m, Cerberus PRO offers an integrated solution for the earliest fire detection in critical areas.

From Stand-alone to Networkable Control Panels

Its uniform hardware concept facilitates the planning process and even expansion of the network at a later time. Even large, campus-wide networks can be easily realised with little additional planning. Floor repeater terminals are loop-powered directly on the C-NET, saving cabling and installation costs (the system's "distributed" intelligence enabling the use of unshielded cables). This also means less planning for connection and power supply. They display system status and events at floor level and enhance user convenience, as visibility can be configured individually. Terminals FT2010 and FT2011 also enhance safety because they remain functional, even in case of an open or short circuit.

Cerberus PRO can be readily integrated into an existing IT network. The backbone of the systems is an innovative, EN 54-approved industrial LAN network that offers increased planning flexibility, allowing the networking of up to 64 panels. Two independent, EN 54-approved Ethernet switches are all that is needed to connect one cluster with up to 16 panels to a fibre-optic backbone. Up to 14 clusters can be connected in this way and since these are then seen as a single network, one central access point is sufficient to connect the remote transmission to a pager system, the emergency services and a danger management system.

Commissioning of the system is simple thanks to auto-configuration. This also enables immediate fire protection during a building's construction and thereby assists in its on-time completion. Enhanced remote operating functions are available for system diagnosis and monitoring, thus saving time and costs by reducing on-site visits when the system is operational.

As a company, Siemens is renowned for the innovation, technological leadership and quality of its products, systems, software and services. It was the first to offer automatic fire detectors and its products are backed by decades of experience and expertise. Siemens will continue to extend the Cerberus PRO product offering – with compatibility of all future add-ons an integral part of that process. This ensures that Cerberus PRO fire protection systems from Siemens are a safe investment, not only initially but also, importantly, over the entre lifecycle of the building. IFP

For more information, go to www.siemens.com

Let's Work Together

Buildings today can have any number of systems installed in order to control security, heating, lighting and ventilation. It is common practice, particularly in larger scale buildings, to combine these different elements into a single, integrated building management system (BMS). However one essential building service has, to date, resisted full integration – fire detection. This situation is set to change with the evolution of OpenConnect Gateway, a new integration device from APOLLO FIRE DETECTORS.

Apollo, a world leader in first class fire detection solutions, has been working on the issue of fire detection integration for some time. The result is a simple, off-the-shelf product, which allows fire detection to be fully integrated into BMS without the need for complex bespoke solutions, or the use of multiple interfaces.

OpenConnect is effectively a 'plug and play' device that can be incorporated into a fire control panel by the manufacturer. It takes the information from the control panel and relays it to the BMS using standard protocols such as BACnet, Modbus or LonWorks.

This brings system specifiers and end users all the benefits of inter-system communication without the risks associated with physical integration. For example, it avoids the potential for a fault in, say, a lighting circuit knocking out the fire alarm. The benefits of OpenConnect include faster response times, reduced system integration costs, no need for specialist training or programming and a simple, consistent approach to fire detection integration.

In practical terms, OpenConnect enables the level of interaction between the different elements of a BMS which are necessary if safety-critical procedures are to be effective. The ability for a fire signal to tell a security system to release certain access doors for use as escape routes is one simple example, but sophisticated phased evacuation procedures and cause-and-effect sequences are also easily achievable using this innovative new product.

The OpenConnect integration solution has been developed in conjunction with Tridium and uses its well-established Niagra AX software framework, on which many building monitoring, automation and control applications are based. Apollo has also worked closely with leading fire panel manufacturers through its Panel Partnership, and will continue to support the development and adoption of OpenConnect as it comes to market in the autumn.

In line with Apollo's belief that collaboration and openness are the best basis for innovation, it will be making the OpenConnect protocol available to participating control panel manufacturers under license. The licensed manufacturer will be able to develop its own software to incorporate this protocol, and will provide a suitable physical connection between its own panel and the OpenConnect Gateway. This allows sufficient freedom for the panel manufacturer to continue to offer its own unique design and features, while incorporating the option for integration with BMS.

As OpenConnect is an integral part of the fire control panel, it is simple to install and reduces associated time and costs. Installers benefit because there is no need for modification of fire detection and alarm devices used in conjunction with OpenConnect-enabled control panels. Nor is there any need for recurring engineering for each new project. End users will enjoy full integration of the fire system and reduced cost through the use of standard software and a single interface, while the integrity of the fire system remains assured.

The new integration device is being made available in four base model options: 200 BMS points, 1,600 BMS points, 12,000 BMS points and 25,000 BMS points. For maximum integration, each OpenConnect Gateway includes as standard two Ethernet ports, an RS232 and RS484 port, a 15V dc input and two spare comms card slots. IFP

For more information, go to www.apollo-fire.co.uk

Voice Signalling Sounder Upgrade

New versions of its all-digital Appello combined voice signalling and tone sounders have been introduced by E2S. They allow four different 30-second voice, music or sound messages to be recorded and replayed at CD quality for improved clarity and intelligibility. The Appello can be configured to replay just the recorded messages or the content can be alternated with one of the 45 alarm tones embedded in the unit.

The four alarm stages are remotely selectable and the message playback and the alarm tones have independent volume controls, enabling the outputs to be fine-tuned to the installed location. They are available in three different sizes: the square A105N with 101dB(A) voice and 112dB(A) tone outputs; the square A121 with 112dB(A) voice and 126dB(A) tone outputs; and the MV121 horn unit with 112dB(A) voice and 126dB(A) tone outputs.

Recordings are made by using either the on-board microphone or via a standard 3.5mm jack socket connected to a remote source. Each of the four stages can be recorded independently, and the unit automatically edits the 30-second recording to the length of the message.

For more information, go to www.e2s.com

Marine Approval for Call Points

'Wheelmark' approval to the Marine Equipment Directive (MED) has been achieved by KAC for selected manual and waterproof call points.

The approval enables products to be installed as part of a fire protection system in passenger ships, cargo ships and tankers. The directive ensures the free movement of equipment within the EU and guarantees the uniform application of standards in Chapter 11-2 of the international SOLAS (Safety of Life at Sea Convention).

The MED also defines the design and test standards for the equipment and the procedures required for testing. Compliance with the MED became mandatory on 6th April 2010.

Other products in the KAC range are currently undergoing third-party Loss Prevention Certification Board testing, with approvals expected shortly.

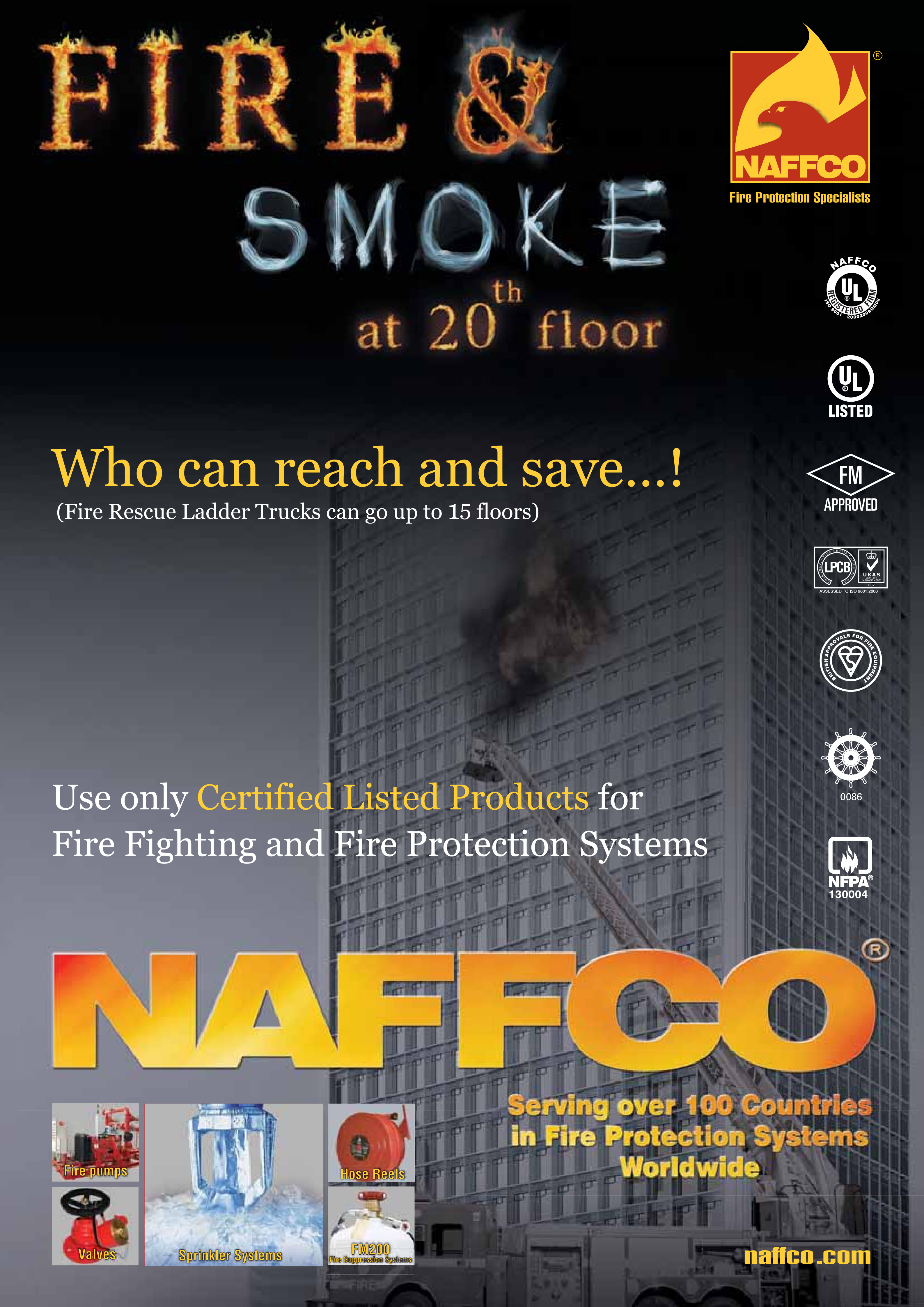
For more information, go to www.kac.co.uk

EN54 Compliant Fire Panels

C-TEC has re-certified and enhanced its range of EN54 compliant fire alarm control panels. The company's new-look XFP addressable and CFP conventional panels are said to now feature stylish and easy-to-use interfaces, combined keypad/key switch entry as standard, and integral EN54-4/A2 switch-mode power supplies. In addition, the CFP Standard conventional fire panel now has extra onboard fire and fault relays.

All the company's XFP panels and Standard CFP panels have been re-certified by the Loss Prevention Certification Board to the latest versions of EN54 parts 2 and 4, which demands additional functionality such as battery impedance monitoring and the ongoing independent assessment of C-TEC's factory process control procedures.

For more information, go to www.c-tec.co.uk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Kitchen System Promises Contamination-free Suppression

Technology developed by JEWEL FIRE SYSTEMS is claimed to provide automatic detection and suppression of fire with minimal or no damage that is contamination free.

K-series detects and extinguishes fires – including fat and oil fires in seconds using only dry watermist that, the company says, means that unlike many other extinguishing agents, the K-series is contamination free; particularly important in kitchens, food preparation areas and restaurants. There are no chemicals present to compromise the operation of the kitchen and smoke damage is all but eradicated. After an incident, a kitchen can be fully operational again in minutes.

It is a true low pressure system, with the dry watermist discharged via a patented supersonic nozzle. The mist also cools to prevent re-ignition, with a 'mist-curtain' created around the source of the fire, protecting the surrounding area and any personnel in the vicinity.

In addition to cooking oil and fat fires, the K-Series can also be used to address a number of other fire risks, removing the need for numerous types of extinguisher. As it is a water based technology, it is also a 100 percent environmentally friendly fire suppression solution and is not subject to any of the regulations governing systems that employ fluorinated greenhouse gases.

For more information, go to www.jewelfiresystems.com

F M Approval for Safety System

The Eagle Quantum Premier (EQP) safety system from DET-TRONICS has earned certification to NFPA 72: 2010 following system evaluation and certification by Factory Mutual. Aimed at industrial applications requiring a hazardous location rated protection system, the EQP system provides flame and/or gas detection, alarm signaling, notification, extinguishing agent release, and/or deluge operation. Components are integrated on a fault-tolerant digital communication network.

Other certifications obtained for the EQP System include: Loss Prevention Certification Board approval to EN54 (fire alarm system/detection) and EN12094 (extinguishing); US Coast Guard approved to 46 CFR 161.002; Lloyds Register type-approved to "Test Specification Number 1"; and hazardous location certification for field devices, I/O modules and controller.

For more information, go to www.det-tronics.com

Voice Alarm Training

In light of the increasing use of voice alarm systems, the UK's FIRE INDUSTRY ASSOCIATION (FIA) has unveiled a new technical training course entitled *Guidance on the Design and Implementation of Voice Alarm Systems*.

The one-day course is aimed at anyone who is involved in the design, commissioning, installation or maintenance of voice alarm systems, as well as anyone involved in fire evacuation strategy, whether in the security, electrical or fire industries. It will cover all key areas of voice alarm systems, including: the differences between a voice alarm system and public address system; standards relating to voice alarms, particularly EN 54 and BS 5839-8; the creation of a voice alarm design plan; the use of stand-alone voice alarm sounders; and the selection and use of loudspeakers. It will also address: audibility requirements and clarity considerations; how to install and find faults with cables; the interface between loudspeaker and fire alarm system; composition and use of life safety messages; using microphones and other ancillary equipment; and amplifier power.

For more information, go to www.fia.uk.com

Cable gets Technology Park Approval

Draka cable has been supplied and installed throughout the new 17-storey complex headquarters building of the Dubai Silicon Oasis (DSO) 7.2 square kilometre free-zone technology park, close to Dubai International Airport in the United Arab Emirates.

The complex houses micro-electronic and opto-electronic related enterprises, a state-of-the-art microelectronics innovation centre, fabrication plants, research and development centres, specialised academic institutions and residential areas.

Options from Draka's Firetuf range of OHLS – Halogen Free, Low Smoke – fire performance cables were selected for the headquarters building's critical safety systems that include extensive and sophisticated fire alarm and emergency lighting installations. They were, Draka says, chosen for the cables' proven ability to maintain their integrity for the specified period during a fire to enable the safe and orderly evacuation of staff and visitors. All of the selected Draka cables are third-party approved by the Loss Prevention Certification Board and the British Approvals Service for Cables, underpinning their numerous national and international approvals.

For more information, go to www.drakauk.com


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or register online at **www.iwma.net**

Phone +49 - 392 92 - 690 25 **Fax +49 - 392 92 - 690 26** **E-mail info@iwma.net**

International Water Mist Conference

The 11th International Water Mist Conference, being organised by the International Water Mist Association, will be held on the 12th and 13th October 2011, and will be conducted in cooperation with independent member institutions. These institutions will provide scientific support for the conference. For the first time, the city of Hamburg in Germany is going to be the venue of the conference.

The conference is open to anybody and will provide a good opportunity for fire safety experts and researchers, representatives of interested corporations and governmental authorities, as well as potential end users to be updated on the current state of water mist technology for firefighting. It will also be a unique opportunity to discuss potential future applications of water mist systems.

A special feature this year is going to be the free exhibition on the first day of the conference. Interested parties such as architects and building engineers have the opportunity to meet all of the major water mist system manufacturers in one place in order to get an overview of the available practical solutions.

Interested parties will find all necessary information regarding this upcoming symposium on the association's website at www.iwma.net. The IWMA office can also be contacted for detailed information on registration, accommodation and other things.

European Standard Needs Common and Immediate Action

One important topic of this year's conference is going to be the European Technical Specification 14972 for Water Mist Systems which will be transformed into a European Standard as soon as possible. The Technical Specification is currently under revision by the relevant committee and, after completion, the results shall be forwarded to the member states for voting.

The objective is still a European Norm for water mist systems. All market players are aware of the desperate need for this standard in Europe. Even though most applications are realised in Europe, no official European document is available to rely on and which provides guidance.

In spring 2011 the IWMA formed its own working group working on the revision of the TS 14972. The work is almost complete and the suggestions will be submitted to the committee for consideration and approval. This important issue will also be further discussed during the Hamburg conference. IFP

IWMA International Water Mist Association

For more information, go to www.iwma.net

Gas Detectors are ATEX & SIL 2 (3) Approved

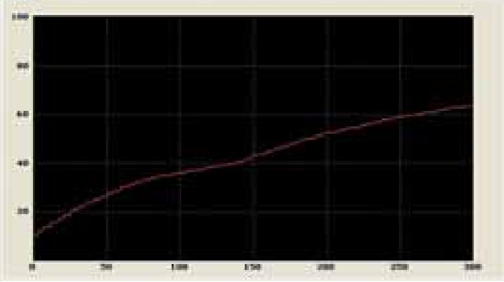
Total reliability and fail-safe products have been the latest endeavours of professional gas detection systems manufacturers. Besides the ATEX norms, the "SIL" standards EN50402 & EN61508 have became the new guidelines to follow when designing new detectors and control panels.

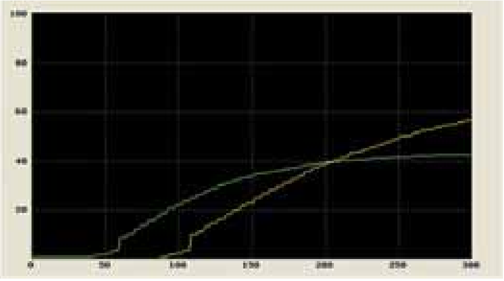
Sensitron's recent improvements and developments have been aimed at offering consistently more and more accurate sensors, reliable electronics and user friendly systems, complying fully with the SIL standards.

After more than 20 years experience, Sensitron's third decade started with obtaining the TUV SIL 3 approval on GALILEO SMS and GELILEO 8/32 control panels. Along with these panels a new hi-tech generation of gas detectors was designed to meet with SIL2 (3) approvals and witness our total commitment to safety. A complete line of SIL2 (3) SMART 'S' gas detectors is now available offering fail-safe electronics and advanced sensing elements.

The detectors can provide either two simultaneous 4-20mA outputs coming from two independent sensors integrated into the same instrument, like SMART SMS, or provide a single output generated by the comparison of signals coming from combined technologies, as with the innovative Hybrid Gas Detector.

The SMART 'S-IR' introduces an innovative concept for reliable gas detectors in the premium safety market. Among the technologies available for gas detection in harsh environments, an innovative alternative is now offered by Sensitron's Hybrid gas detector SMART S-IR. It compares the signals received from two different sensors (Pellistor and Infrared) integrated into a single stainless steel head to provide an accurate and prompt warning, while rejecting erroneous alarms.





The detector uses a hybrid technology sensor. The standard configuration comprises a high quality and reliability industrial Pellistor sensor and the NDIR sensor IRNET-P that provides an analogue voltage output that is linearized and temperature compensated.

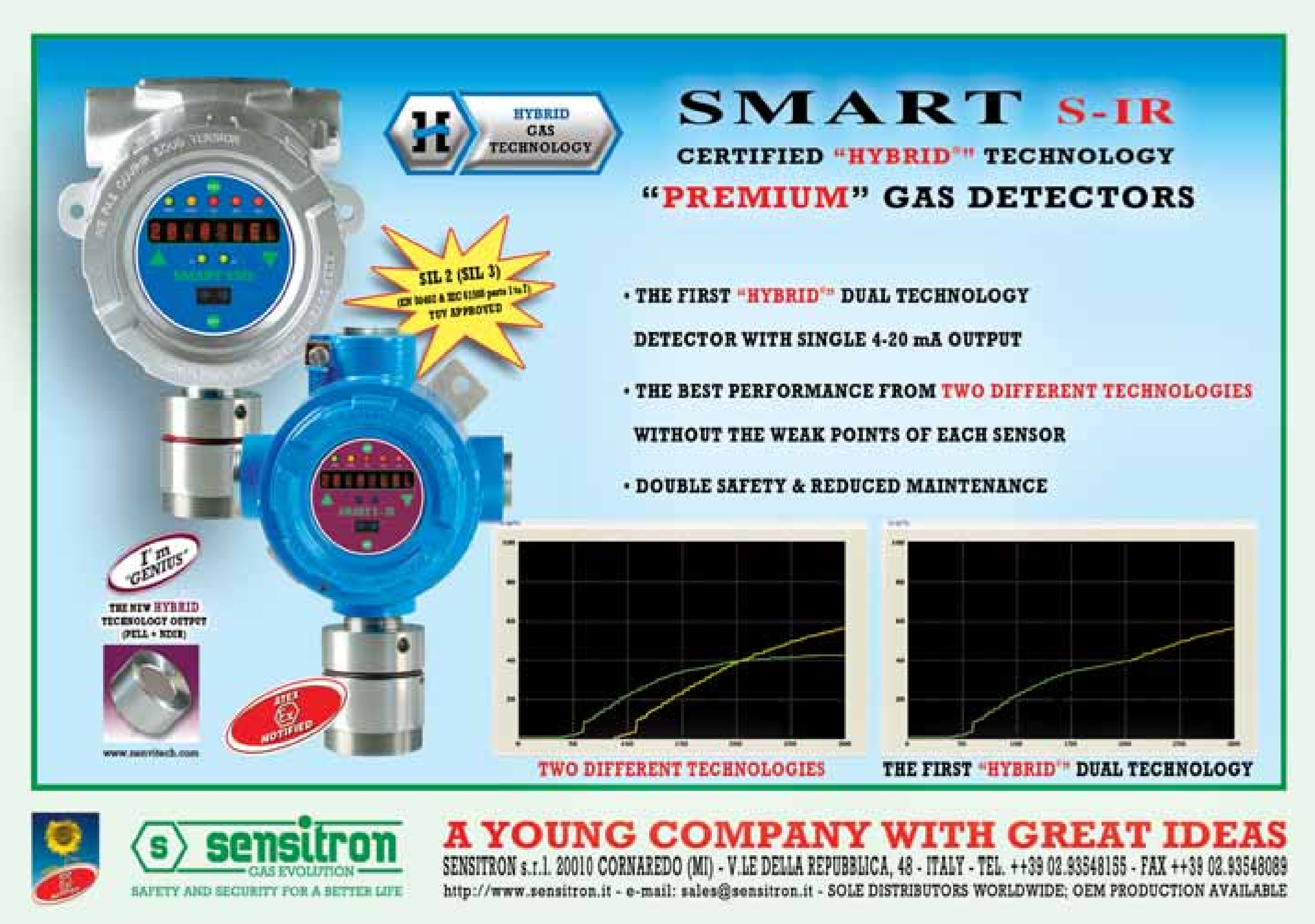
The behaviour of the sensors is constantly monitored by a microprocessor and the incoming signals are compared to supply an output corresponding to the worst situation revealed in the shortest time. It guarantees the highest accuracy, with false alarm conditions close to zero.

SMART S-IR offers eight digits back-lit display and five mode status LEDs and provides three-wire 4-20mA output, RS485 Modbus communication and a further three relay outputs. As optional feature, is that it can come complete with Hart communication interface to allow remote monitoring.

For easy and safe maintenance, SMART S-IR features one-man non-intrusive calibration and, thanks to the innovative hot-swapping function, sensors can be replaced without interrupting the system operation or disconnecting the detectors. This makes SMART S-IR ideal for harsh environments that can not be declassified for maintenance.

All SMART 'S' detectors are SIL 2 (3) certified in compliance with EN50402/EN61508, and, as with all SMART3G, are ATEX certified according to ESR (IEC/EN60079-1) and Performance (IEC/EN60079-29-1). IFP

For more information, go to www.sensitron.it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SEVO Systems Expands Suppression System Design Capabilities

SEVO SYSTEMS has announced expanded design capabilities for its SEVO™ 1230 Clean Agent Fire Suppression Systems. Utilising 3M™ Novec™ 1230 Fire Protection Fluid, the SEVO™ 1230 FORCE500™ Clean Agent Fire Suppression System at 500 psi (34.5 bar) is now the premier replacement for halon and HFCs in fire suppression systems.

The company has demonstrated that its systems simplify and reduce the cost of conversion from halon 1301 to Novec 1230 fluid. The FORCE500 provides enhancements that allow even greater flexibility in design capability for both the retrofit of halon installations as well as in new construction. In over 90% of halon or HFC retrofit cases, the existing halon 1301 piping network can be utilized, while only the existing halon 1301 cylinder and the existing nozzles need to be replaced.

These enhancements benefit designers using both the FORCE500 at 34.5 bar and also with SEVO's conventional 25 bar system. The design enhancements for the FORCE500 increases the distance from cylinder to nozzle by 300% over other systems on the market, meaning fewer nozzles are required to meet established standards. Only one 64mm nozzle is needed to cover a 500 cubic metre area versus a conventional 50mm nozzle. These enhancements establish SEVO 1230 Systems as the only clean agent fire suppression systems on the market that provide these expanded design capabilities. The FORCE500 is the only one of its kind available for replacing halon and HFC systems with Novec 1230 fluid. All SEVO Systems are approved by Factory Mutual (FM) and are UL/ULC Listed.

SEVO Systems was formed in 2001 to develop and commercialise a revolutionary new technology invented and marketed by 3M that represented a major breakthrough in halon replacement technology – combining high extinguishing efficiency with excellent environmental, health and safety properties.

With the highest life safety margin of any clean agent, zero ozone depletion potential, five-day atmospheric lifetime and a global warming potential of one, Novec 1230 fluid offers the market a long-term, sustainable alternative to halon and HFCs. SEVO worked hand-in-hand with 3M during the early development period following its discovery. SEVO represents a "safe environmental choice" and was the first OEM partner of 3M to commercialise a UL approved fire suppression system using Novec 1230 fluid. SEVO continues to develop new application technology for use with Novec 1230 fluid, revolutionising the industry with ground-breaking approaches to sustainable fire suppression.

Novec 1230 fluid is designed to balance the need for extinguishing performance, human safety and low environmental impact. 3M stands behind Novec 1230 fluid by offering an industry-leading 20-year warranty, the 3M Blue SkySM Warranty. For complete terms and conditions or to register your system for the Blue Sky Warranty, visit www.3M.com/novec1230fluid. IFP

For more information, go to www.sevosystems.com

Fitness for Purpose – Tried, Tested, Trusted

The most significant recent development in UK fire safety has been the Fire Safety Order which operates overtly within a recognised culture of responsibility that rests, in the first instance, with the building owner who is obliged to take reasonable and practical measures for the safety of occupants, founded on a risk-based assessment.

But responsibility extends along the supply chain to include those who install fire-resistant systems, including design, specification and manufacturer of the fire-resistant product.

Pilkington has a long tradition of commitment to fire safety, being at the forefront since the introduction of wired glass. Pilkington Pyroshield 2 polished wired is still the simplest fire-resistant glass, widely used. Although only 6mm thick, it is resistance against the stringent US hose stream test – a 30 psi (207 KPa) full-on hose stream played over the hot fire-exposed glass surface.

Pilkington also leads the way with high performance clear fire-resistant glass. Pilkington Pyrostop (fire insulation and integrity) and its offshoot Pilkington Pyrodur (integrity) have the advantages of more than 40 years testing, development and application. Examples are special glazings for high level protection of firefighter lobbies and 120-minute rated load bearing fire-resistant glass floors.

We want those who buy, use and rely upon our fire-resistant glass to be confident that we are doing whatever we can to ensure reliability of fire performance. Fire conditions are fierce and notoriously unpredictable. Although a product may typically be tested for 30 or 60 minutes in a furnace, it may well have to resist extended fire exposure in practice for several hours. That is why Pilkington has a specialised R&D commitment to fire-resistant glazed systems, including repeat and continuous testing in our own fire test furnaces.

That intensity of daily testing is backed up by extensive approval in test centres around the world. The underlying fire-resistant glass technologies have to be robust, capable of dealing with a wide range of possibly intense and extended fire exposure. All materials deteriorate in fire, some faster and more dangerously than others. A robust technology for fire resistance needs to be predictable, consistent, and repeatable in its fire performance and mode of deterioration, with a high level of confidence in its predictability. Fire is a very challenging environment for glass. That is why Pilkington takes great care in the development of its fire resistant glass range, and subjects the products and foundation technologies to searching and critical evaluation.

Pilkington Fire-Resistant Glass Family

Pilkington Pyrostop:
An extensive range based on quality intumescent interlayer technology, providing integrity and insulation performance in appropriately glazed systems for 30 to 180 minutes insulation in appropriate frames. Widespread application.

Pilkington Pyrodur:
Integrity version of the established Pyrostop interlayer technology, for 30 and 60 minutes. Additional benefit is insulation performance for 15 minutes, to reduce risks and lower probability of secondary fire transmission.

Pilkington Pyrodur Plus:
Unique 7mm integrity-rated glass for 30 minutes class, based on an advanced proprietary interlayer chemistry, with the benefit of full insulation capability rated at 15 minutes (European terminology E/EW 30 and EI 15).

Pilkington Pyroclear:
A new generation of super-modified toughened integrity fire-resistant glass using special NSG processing and product technology, with a successful record in Japan for more than eight years. Now brought to Europe, with particular strengths of reliable and recognised consistency from test to test. Especially for metal systems.

Pilkington Pyroshield 2 Safety Clear:
A robust traditional wired glass, backed by decades of expertise in fire-resistant glazing systems. Capable of the European radiation criteria (EW) for 30 minutes. Fully tested for 60 minutes integrity; unlike alternatives providing approvals in full glazing assemblies with practical partition sizes and tested transom and mullion arrangements (including to BS EN test standards).

Acoustic insulation options with R_w from 34dB to 48dB.

All products have achieved CE Mark certification. IFP

For more information, go to www.pilkington.com and www.pilkington.co.uk/specifire

Preparation the Key to Petrochemical Fire Safety

Paul Frankland

Sembcorp Protection

Having the right equipment in place to detect and suppress a petrochemical fire is essential, but so is having well thought out emergency preparedness plans, being in a position to ensure fast response, and having effective incident control.

The response in the first few minutes to a petrochemical fire is critical to the final outcome, as anyone who has ever found themselves in that unenviable position will tell you. The fact of the matter is that irrespective of how sophisticated the detection and fire suppression installations, nothing will make up for a lack of emergency preparedness, inadequate training or poorly implemented incident management. The golden rule when preparing for such an emergency is: assume nothing and test everything.

First, it is essential to have a realistic understanding of the special risks associated with this type of fire and of the often unique challenges of the particular site. However, this is a task that needs to be entrusted to expert hands. Such risk assessments must be carried out and regularly updated by fire safety professionals who can demonstrate experience in these often volatile and special high-hazard environments.

Seeing the Big Picture

Risk assessments for petrochemical plants, indeed for any high-hazard site, should not be limited to what might be described as "internal" fire safety threats and challenges. If evidence is needed of this, it is necessary only to look at what happened at the Fukushima nuclear power plant in Japan where the disaster was triggered by an offshore earthquake and tsunami. In the current uncertain

international climate, the risk assessor also has to consider the very real prospect of acts of terrorism aimed at headline-grabbing mass destruction of property and lives.

The assessor also needs to take into account what is going on immediately beyond the site's perimeter fence: what spill-over risks do neighbouring properties – invariably also petrochemical plants of one form or another – and their processes pose; should neighbours' emergency preparedness plans be integrated with the site under review; what facilities exist that can be shared, and can they be relied upon around the clock?

Risk assessments should not be limited to "internal" fire safety threats and challenges, as the Fukushima nuclear power plant disaster in Japan clearly demonstrated.

This can easily take the risk assessor outside his or her usual sphere of expertise. For example, should the site's security defences be improved as part of the plan to lessen the likelihood of arson attack? When determining the on-site fire suppression requirements, the assessor should also take into account the resources that are available from the local emergency services, what specialist equipment does it have; how readily available is it; and how quickly can it be deployed?

It is also vitally important to audit the site's emergency control centre arrangements. Without an effective emergency control centre, incident management and the integration of all of firefighting, medical care, site evacuation and spillage control will be impossible to achieve.

Maintaining Control

There are strong arguments in favour of having an off-site emergency control centre. As the explosion and ensuing fire at the Buncefield oil depot in the UK and similar petrochemical fires around the world have shown, on-site facilities can so easily be destroyed in large-scale incidents of this nature. With every minute counting, having to re-establish an emergency control centre is not a viable option. Arguably, petrochemical sites need both on-site and off-site emergency control centres, both of which need to reflect the unique circumstances that exist at the site, and the skills, knowledge and experience of the people manning them.

It is equally important to ensure that the right resources are ready at a moment's notice, and this means more than just having the right equipment available. Important though that is, it is essential to take nothing form granted. What are the implications of the site's water supply being damaged by an initial explosion, or if the fixed fire suppression

equipment is destroyed in the initial blast? What if the devastation means that the site's stock of foam concentrate is inaccessible?

Attempting to answer these questions is certainly not something to embark upon when an emergency occurs. Back-up resources have to be in place and, like every other aspect of effectively being prepared for a petrochemical fire, these stand-by resources have to be constantly under review and regularly tested.

This is where pre-fire planning is so important; to determine and test – in advance – precisely what resources are needed for each and every fire scenario. This needs to encompass what equipment is needed, where it should be positioned, the availability and pressure of nearby water supplies, the need to cool adjacent facilities and the impact of high winds on the effectiveness of these plans.

Training for Performance

There is absolutely no substitute for training. Site incident controllers and personnel with operational responsibilities have to be trained to take control at the scene of an incident; emergency control centre staff have to be ready to direct operations; fire wardens and appropriate staff at all levels need to be competent in the correct use of breathing equipment, first aid and conflict management.

On-site practice, together with full-scale exercising and testing of every part of the emergency arrangements are equally important. And this needs to be conducted in as close to a "real life" scenario as possible. A range of challenges should be built into these exercises to test every possible set of circumstances. They will also create confidence in the team's ability to safely tackle the emergency, either temporarily as the site's front-line defence until the emergency services arrive, or as the site's professional emergency response resource.

Effective Resourcing

None of this, of course, lessens the need to provide the most effective detection, alarm and suppression equipment. This will probably take the form of fixed equipment providing primary around-the-clock protection for such structures as cone roof tanks; open-top floating roof tanks; covered floating roof tanks; horizontal tanks; bunds, and spill grounds. However, it cannot be overstressed that, potentially, all of this equipment is itself at risk in the event of an explosion.

It is important to consider what resources the local brigade has, and what additional mobile resources need to be available. Of course, an indispensible resource is water, and dynamic system testing is the only way to provide evidence that the system can be relied upon to deliver the required quantity, pressure and flow rate. Hydrant flow testing measures the fire main pressure drop and establishes what residual pressure is available to ensure that hydrant flow values are sufficient to cover the risk.

It is essential to move away from exclusively considering what to do in the aftermath of a fire, and start paying much more attention on avoiding being faced with the prospect.

While petrochemical fires are, thankfully, not everyday occurrences, when they do occur the consequences can be economically and environmentally devastating, as well as being seriously life-threatening on a significant scale. So it is essential to move away from exclusively considering what to do in the aftermath of a fire, and start paying much more attention on avoiding being faced with the prospect. More time and energy needs to be devoted to implementing sustainable measures that will reduce or eliminate the risk of fire. Certainly, this means giving more thought to both passive and active fire protection, and seeing fire engineering as a dynamic and indispensable business continuity process, and devising and implementing fully integrated emergency and disaster management plans. IFP

Paul Frankland is Vice President of Sembcorp Protection

For further information, go to www.sembutilities.co.uk/protection/


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"Greenwashing" – and how to avoid it

Jennifer Woofter

Strategic Sustainability Consulting

The Coalition for Responsible Fire Protection began in 2010 as a healthy discussion about how to balance environmental sensitivity with the need to preserve life and property. Many large firms now expect or even demand more environmentally responsible products and systems, which will reflect and support their own environmental commitments. While small steps have been taken to "green" the fire protection industry, to date the Coalition believes it has been a mostly cosmetic exercise.

The Coalition realises that the only convincing way for the industry to achieve a credible level of sustainability for fire protection products and systems is through the creation of industry standards that can measure sustainability. Furthermore these standards, it believes, must be based on the complete range of environmental impacts over the entire life cycle of the product or system in question. This life-cycle assessment (LCA) approach will require a fundamental re-evaluation on the way fire protection systems are monitored throughout their useful life and in their disposal or destruction. Fortunately the Coalition is not alone in its thinking, and the LCA approach is reflected in the structure of the internationally recognised ISO 14040 series of standards.

Currently, an increasing number of customers are demanding more environmentally-friendly products. The list of businesses concerned with these issues is rapidly growing, and now includes the United States Government and commercial companies such as Walmart. These organisations want to purchase green products from green companies. When first introduced, these eco-requirements acted as qualifiers, offering incentives to suppliers to meet green expectations. These same green criteria now act as disqualifiers, where vendors are disqualified for not meeting the requirements.

This pressure to meet eco-criteria is leading some manufacturers to develop their own green labelling systems. Unfortunately, without independent standards developed for interpreting,

measuring and reporting on a fire protection product's environmental claims, the industry risks allegations of "greenwashing" – that is, misleading consumers about the environmental attributes of advertised products.

The Coalition's position is that Greenwashing must be avoided at all costs. Not only does it betray buyers, it also squanders the potential environmental benefit that might have been accrued through a better purchasing decision. Greenwashing also takes market share away from legitimate green products, and creates an atmosphere of cynicism and doubt about all environmental claims.

To prevent greenwashing, The Coalition supports the development of standards that are life-cycle based, third-party certified, publicly available, and transparent. It is an ambitious endeavour and will require support and input from a wide variety of participants. The Coalition is open to all stakeholders in the fire protection industry; whether a manufacturer, installer, maintainer or system user; the Coalition encourages the participation of all stakeholders in the discussion process.

The Global Environment and Society's Response

Whether you are a climate change evangelist or a sceptic, there is no doubt that society in general is taking a much more pro-active, self-regulating view of our responsibilities to the environment. Many of the questions we ask ourselves are prompted by significant events that we see as unusual or that are interpreted for us as unnatural: an earthquake in South America, a Tsunami in Asia, nuclear meltdown in the Ukraine; or as seen in Japan recently: all three.

The exponential growth in global population since the early part of the 20th century is closely tracked by the expectation of much improved lifestyles in the developed economies and the establishment of growing life expectancies in developing regions. This is the market for our general goods and services, and to satisfy the demand created by such rapid growth we have successfully built an industrialised society that has been very effective in satisfying the expectations of its customers.

But the price paid by our global environment is visible, to the degree that we are able to observe and measure the change to its condition and make judgements on its health. Looking forward, we are also much more aware of the real and implicit costs to our world of increased energy and the use of finite natural resources to support the lifestyles to which we all aspire.

In response to these challenges, the international community has come together to create consensus on action. Through myriad studies and action plans including the Montreal Protocol and the Kyoto Treaty, the international community has taken significant steps to address those environmental changes that have been observed and proven to present risk.

Government Action and Industry's Response

Environmental activists are no longer the lone voice demanding that we address the problem of climate change. Governments have taken on board the impact to our climate and correctly interpreted the risks in terms of national and regional threats, for example, flooding in Micronesia, pollution of rivers and water courses in Europe and the rising cost of medical care all over the world. Increasingly, we are seeing governments introduce more stringent regulations to eliminate known risks and more effectively regulate the use and impact of industry's products and services.

Business too is committing itself to ambitious environmental goals, partly in reflection of increased regulations but also, importantly, because it recognises that demonstrating its civic commitments will meet its customers' expectations of environmental responsibility. This in turn creates respect for the company and promotes stronger recognition of the company's brands in the marketplace. Big business knows that it needs the goodwill and support of its customers to keep its products in the public eye for the right reasons. Moreover, leading businesses are finding that sustainability can be a lens for innovation and competitive advantage – making huge impacts on the financial bottom line through operational efficiencies, new product design, and more productive employees.

The first wave of environmentalism focused on bringing attention to dramatic environmental degradation and a resulting flurry of laws and regulation to protect natural resources. The second wave of environmentalism centred on good corporate citizenship, and building a positive brand by being "good to the environment". The Coalition's view is that we are now in the midst of the third wave – where organisations can create and drive value by integrating sustainable thinking and design into their operations and products. This value, however, depends on the ability of buyers to judge and differentiate between different "green" claims, and those who cannot pass the test for greenwashing will find not only that they have lost the green buyers, but that their overall credibility and trustworthiness in the market has declined. For that reason, it is critical that like-minded businesses come together to ensure that rigorous and robust sustainability criteria are developed. Sustainability is not going away, so the Coalition's view is do not get left behind. IFP

The exponential growth in global population since the early part of the 20th century is closely tracked by the expectation of much improved lifestyles in the developed economies and the establishment of growing life expectancies in developing regions.

Jennifer Woofter is President of Strategic Sustainability Consulting

For further information, go to www.responsiblefireprotection.org/?id=1470369225


TRACE
AUTOMATIC FIRE SUPPRESSION SYSTEM

New System Come Data Centre

A new controlled-flow inert gas suppression system developed by Kidde Fire Protection reduces installation time significantly, having cut installation on a large data centre project by at least 30% when compared with ordinary inert gas suppression systems. It also resolves the problem of using inert gas suppression when only minimal pressure relief is possible.

Kidde Fire Protection

Unlike ordinary inert gas systems, where the discharge is controlled by a single fixed-flow restrictor that causes an initial high peak mass flow (on which the pressure relief vent area is calculated), the new Argonite C60 system uses an innovative flow control mechanism that controls the flow of gas throughout the discharge period.

This means that the peak mass flow of suppressant can be 60% lower than in ordinary systems, without compromising fire suppression performance. This reduced peak mass flow correspondingly reduces the pressure relief vent area in the protected enclosure; this significant reduction turned out to be a crucial benefit for one of the first major projects to be completed.

It is, however, far from being the only benefit. The controlled release of the suppressant gas and constant flow rate in the system means that smaller diameter pipework can be used for the delivery network. Not only is this less costly in itself, it also means that smaller holes are needed to allow the passage of the pipes into the protected enclosure, leading to further savings. Finally, the lighter weight of the pipe makes it faster and easier to install.

Further benefits stem from the system's modular manifolds and its front-mounting actuators. The manifolds are available in four, six and eight-cylinder versions that can be combined in any required combination to meet the needs of the application, making it faster and easier to install than conventional types.

The front mounting actuators can be readily installed without the need for engineers to work at height to reach the rear of the cylinder valves. As the cylinders are approximately 1.8 metres highs, installation engineers would normally use step ladders for this task, but the C60 system negates the requirement, which means no climbing up and down and no moving of step ladders. This had a particular impact on the first major project – a high-security technical area within a data centre, comprising a room void of 5,500 cubic metres and a floor void of 1,080 cubic metres – that required 180 cylinders, resulting in a substantially reduced installation time, and the hazards that are associated with working at height.

Achieving effective fire suppression in data centres is never a straightforward task, and this particular data centre is dedicated to the handling of financial data for a major international banking client and houses over 500 data racks. Because of the sensitive and critical nature of the information, the centre had been constructed from

s up Trumps for

steel-strengthened panels with internal security bars. Additionally, in order to maintain the highest possible levels of security, it was a prime requirement for the fire protection project that the penetration of these walls – necessary for venting purposes – had to be kept to a minimum. In fact, minimal wall penetration was also highly desirable from a financial point of view, as the high strength of the walls meant that normal techniques for making apertures could not be used, and the services of a costly specialist contractor were required.

Another issue that had to be taken into account was that the location of the secure area meant that it was effectively an enclosure within an enclosure, further complicating the pressure relief requirements and creating a potential need for cascade venting arrangements. The client's consultant had also made a firm stipulation that the fire suppression system should be a clean total-flooding inert gas suppressant agent, rather than a clean chemical agent. Argonite was chosen because it has properties that are ideally suited to this application and its efficacy has been well proven in demanding data centre fire suppression installations.

Argonite is a 50/50 mixture of two atmospheric gases – argon and nitrogen – selected for their ready availability and non-toxicity, and blended to attain the same nominal density as that of air. This minimises agent leakage after discharge and ensures sufficient agent retention times and good coverage at all heights within the protected area. It is also well established as being non-corrosive, non-conducting and can be used safely in manned areas. With zero ozone depletion potential and zero global warming potential, it is an environmentally responsible choice.

As with all inert gas suppressant agents, relatively high agent concentrations are required to attain fire extinguishment. Argonite has, for example, a design concentration of 40.3vol% against Class A fires, and enclosure pressure relief is required to ensure that the pressure excursion upon system discharge remains within the enclosure's specified pressure limit. This requirement would normally be potentially problematic in this type of application because of the wall penetration restrictions and the need for cascade venting. However, the new C60 system overcame the challenge.

With this project already well underway, there was a late change in the end user's requirements and it became necessary to add a number of "cold aisles" to the installation within the enclosure. In essence, these are areas that receive extra cooling and, in order for this to be effective, the cold aisles are partitioned off from the other areas. This effectively creates small enclosures within the main enclosure and, while these internal enclosures presented few pressure relief problems, it was necessary to arrange for additional nozzles to be installed to ensure that the concentration of suppressant gas within the cold aisles reached design concentrations within the prescribed time.

The design calculations associated with extending the system were straightforward, confirming that, as expected, no changes were needed to the pipework other than to make provision for connecting the new extensions. Had an ordinary inert gas system been used it is likely that the work associated with this late design change would have been much more complex, and that it would almost certainly have involved replacing the upstream sections of the pipework with larger pipe sizes to accommodate the increased delivery rate.

While meeting the complex requirements of this demanding application had initially seemed challenging – in particular, satisfying the end-user's conflicting requests for an inert gas system and for minimal penetration of the enclosure for venting – it was ultimately found that the new C60 system was an ideal solution. Not only did the controlled-flow technology used by this system greatly reduce the need for enclosure pressure relief, its other features also helped to reduce the time needed to complete the installation and the overall project costs. Additionally, when a modification was needed late in the day, the system also proved its worth in terms of flexibility and extensibility. IFP

Kidde Fire Protection

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Len Swantek

Victaulic

Safety First

There is a lot more to fire protection regulation than simply following the rules. Helping shape them is important; so is the sharing of responsibility in the industry.

Regulation is a highly complex affair for every company involved. With nearly 100 different projects in the approval cycle at any given time plus follow-up examinations, a company such as Victaulic, for example, can expect to be audited over 200 times each year by external agencies. Given the critical applications where the company's components are applied across such a broad range of systems around the world, it is not surprising that there should be so much scrutiny. But it does require considerable management and coordination to meet both agency and customer requirements.

Before regulatory procedures even begin, a tremendous amount of time is put into research and development. Since Victaulic invented the grooved piping system more than 85 years ago, it has pioneered new designs to solve market problems and make products more robust and yet economical to install. Victaulic is a design-focussed company that drives industry trends, and its engineers are involved in research and development all year round, evaluating new ideas and working on prototypes.

Development of a new product is lengthy – often taking well over 18 months. Concurrent with this is also process development to assure consistency of global manufacturing to a wide range of international standards.

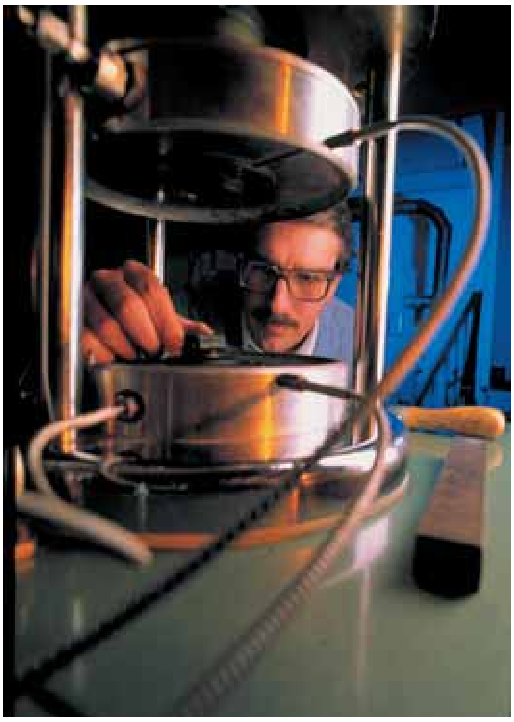
Once a new product is ready for market and the company is certain that every unit shipped will perform identically, rigorous internal pre-qualification testing is carried out in anticipation of regulatory requirements. Victaulic replicates known scenarios that could be encountered, applying process technology and even re-engineering products as necessary.

Making the Global Grade

Fire protection industry regulations are constantly changing and a clear understanding of the most up-to-date requirements is vital to the successful completion of the approval cycle and managing time to market.

The level of regulatory involvement varies from one market to another, but fire protection is one of the most regulated industries and the product testing carried out is among the most exacting of all market segments. While heavily influenced by the insurance industry, fire protection and fire safety also are among the most widely recognised areas of public concern globally, irrespective of cultural or demographic influence.

For its fire protection line, Victaulic refers to the five most commonly specified regulatory authorities in the world as "platform agencies" and submits new products to these as a first step in building an official third-party record of performance validation. The agencies in this group are FM Approvals (FM) and Underwriters Laboratories, Inc. (UL) in the US, the Loss Prevention Certification Board (LPCB) in the UK, VdS Schadenverhütung GmbH (VdS) in Germany and China Certification Centre for Fire Products (CCCF) in China.



Take a product such as a Style 009H FireLock coupling – one of the most popular Victaulic products and part of their patented "installation-ready" line of couplings. This product consists of two ductile iron housings, an elastomeric gasket, two bolts and two nuts. The 009H was subjected to testing and examination by 20 different agencies globally.

Victaulic initiates the testing process by sending a confidential data "package" to each agency, containing approval objectives along with a product performance outline with detailed specifications, as well as internal test data and technical drawings. The components of this package must be accurate and complete, and can take weeks to compile.

Lifelong Assessment

In order to facilitate the actual performance testing, product samples, pipe of various specifications and other related equipment must be organised and shipped to applicable agency facilities globally. This is another time-critical operation – as any delays on the part of a manufacturer could result in a lost position in the testing laboratory's queue. At this stage, documentation must already be available in multiple languages for examiners to assemble equipment themselves, based on an assumed level of skill equal to that of the end user. On average, the testing process can take three to six months to complete.

The approval authorities also are concerned with the manufacturing and assembly locations of specific finished parts or sub-assemblies. Those parts that are most critical to the overall performance of the finished assembly will have greater regulatory oversight. Victaulic manufactures in a number of locations globally to optimise supply chain logistics, but this can greatly increase costs as each location must be certified and audited on a regular basis.

In the event of a non-conformance at this late stage, a manufacturer risks losing valuable time to market and must resubmit for the evaluation process again, but only after design alterations have been finalised and documented. Upon successful completion of all platform certifications, the next segment of regional approvals can be initiated with similar steps involved.

With over 32 regional agencies throughout North America, Europe, the Middle East, Africa, India and Asia-Pacific, and each having individual jurisdictional authority over specific systems or applications, approvals for the remaining market segments can take another six to nine months to complete.

Manufacturers like Victaulic can go to market only when they have secured all applicable certifications and each product or package carries the appropriate agency markings. Once complete, only then can results be reviewed and data fed back to the research and development teams. Finally, all project correspondence is archived and manufacturers move on to the audit management process.

Social Responsibility

Audit management is the final phase in the regulatory cycle. This phase starts when a product certification is officially released and ends only when the product is no longer produced. Through various follow-up procedures and factory production control systems, products are retested annually as a minimum requirement. Some regulatory authorities re-examine products quarterly – and some even on a weekly basis to ensure high-quality performance to regional agency codes and standards and to verify manufacturing processes remain unchanged.

Auditing is important because codes are constantly evolving to improve health and safety as a result of real-world factors. Witness, for example, the recent changes in the EU related to commerce policies. Additionally, changes are frequently driven by trends in construction techniques – some for instance are prompted by the push towards lighter-weight and more disposable materials – but also by situations and events that occur in the field.

Victaulic views its role in the regulatory process as going beyond simply respecting the rules. The company has a department dedicated to regulatory compliance with regional teams across the globe, and sees regulation as an area of social responsibility where it can participate to benefit the communities in which it conducts business. An example of this is its dedication and support of fire safety research, and direct participation within many local and global codes and standards development committees.

The company works with regulators as well as other manufacturers to overcome problems encountered in the various industries and to better protect property and lives. Victaulic aims to learn from real-life situations and effect change where needed – whether this means collaborating in committees with competitors and regulatory bodies to create the most well-rounded and effective regulations, or joining with contractors and end-users to help solve real-world problems and build on shared learning to develop a new generation of products.

Working together is important – the safety of our communities is after all, the number one consideration of everyone in this business. IFP

Len Swantek is Director of Global Regulatory Compliance at Victaulic

For further information, go to www.victaulic.com

Intumescent Coat Protection

Allan Jowsey

International Paint

The intumescent coatings industry has moved at a fast pace over recent years. Understanding passive fire protection technology and the impact of legislation is important to ensure compliance with international standards for fire and life safety.

The ever-increasing use of steel as a construction material has led to enhanced flexibility in design, as well as significant time savings in the construction industry. However, its use in social infrastructure and buildings has brought an additional challenge – that of fire safety. In the event of a fire, steel can lose its strength and collapse, resulting in damage to property and in the worst case, loss of life.

Almost all buildings incorporate some fire safety measures. In the event of a fire, structures are required to maintain their stability for a reasonable period of time to enable occupants to evacuate and to provide safety to fire-fighters. There are numerous products available to designers to satisfy the fire resistance requirements of their projects. Intumescent coatings provide one such method. They react in the presence of intense heat to form an insulating layer, protecting the underlying steel and extending the duration of its structural integrity.

Traditional methods of fireproofing such as cementitious coatings and gypsum boards can only be applied on-site and are often considered aesthetically unappealing for visually-exposed steelwork and labour-intensive to apply. Intumescent coatings allow for easy off-site and on-site application during construction and provide an attractive finish that does not compromise intricate designs and shapes created from the steel. This allows maximum architectural expression for structures such as airports, stadiums, leisure facilities, hospitals and office buildings.

As with any fire protection product, it is important to understand its basis to ensure correct specification and one that is fit for purpose. This article outlines some of the keys issues that architects, engineers, fabricators, applicators and Approving Authorities should be aware of when dealing with intumescent coatings.

To fully appreciate the role of passive fire protection, it is important to understand three main things:

- How a structure will perform in the event of a fire?
- What fire scenario may it be exposed to?
- What benefits can passive fire protection offer?

Structural Response

Structural steel reduces in strength and stiffness with increased temperature. This can have a detrimental effect on the stability of a structure. Unprotected steel will heat very rapidly in a fire. The aim of an intumescent coating is to insulate

ings for Fire

the steel and keep it relatively cool for the required fire resistance rating.

The response of a steel structure in a fire can be further influenced by the maximum temperature attained, the degree to which it is loaded, its restraint and the mechanical properties of the steel itself.

The term 'Fire Resistance Rating' is associated with the ability of a building element to perform its function as a barrier or structural component for a specified time during the course of a fire. It is often specified in combination with a critical steel temperature as set by a qualified engineer. Durations vary with legislation around the world, but a typical period may be 60, 90 or 120 minutes.

The basis for the rating is typically specified in accordance with design standards and guidance documents. These documents vary in nature around the world, but fire resistance requirements are strongly related to the risk of fire (occupancy use), the height of the structure and may be associated with provision of a suppression system. It is critical to understand the correct legislative requirements for a project.

Intumescent coatings can cover a wide range of structural sections including universal beams and columns, circular and rectangular hollow sections and concrete-filled tubes. Depending on the type of intumescent coating, it is possible to protect members for up to three hours fire resistance. Manufacturers also assess their products over a wide range of critical temperatures – known as Multi-Temperature Assessments (MTAs). These may typically be 350°C to 750°C and can permit engineers to specify temperatures of their structural elements as part of an optimized design.

Fire Types

The fire protection industry has adopted standard "fire curves" for different types of fires:

- **Cellulosic** fires are fuelled by combustibles such as wood, paper and textiles. They are typically associated with commercial infrastructure.
- **Hydrocarbon** fires, or pool fires, are fuelled by oil and gas and have a very rapid heat rise. They can be extremely turbulent as they entrain oxygen to maintain combustion.
- **Jet fires** are a particular group of hydrocarbon-fuelled fires expelled from an orifice under high pressure. They can have high erosive forces in addition to high heat fluxes above those experienced in open pool fires.

Epoxy intumescents are used where there is a risk of hydrocarbon and jet fires, Thin-film acrylics are typically used where there is risk of a cellulosic fire, although an epoxy coating may be required for durability.

Intumescent Coatings

Intumescent coatings work by undergoing a chemical reaction when heated to form an expanded, thermally insulating layer. The coatings include an acid source – typically phosphorous-based, a carbon source and one or more blowing agents dispersed in a suitable resin system. At temperatures of around 200°C the acid and carbon source react to form a carbonaceous melt which is then expanded by gases generated during the thermal decomposition of the blowing agents resulting in a sponge-like char.

Intumescents are available in categories that include thin-film water-borne or solvent-borne acrylics and high-build epoxies. The choice of which to use on a specific project is dependent on factors that include:

- **The fire resistance rating and fire exposure type:** often set by a design standard and influenced by the occupancy use of the structure.

- **Legislative requirements including the fire test standard:** strongly linked to global geographic location with fire test standards being referenced in design documents.
- **Durability and anti-corrosion requirements:** the degree of environmental exposure of the steel is important in selecting an intumescent coating. Environmental Classifications are set out in ISO 12944 Part 2 (C1 to C5M).
- **Aesthetics:** manufacturers often supply sample panels to demonstrate the levels of finish available, including top-coat colour ranges.
- **On-site or off-site application:** linked to construction sequencing and use of trades on site. Intumescents coatings are available that are dedicated to either one application or both.
- **Surface preparation:** steel may be galvanized, abrasive blast cleaned to SA 2½ in accordance with ISO 8501-1:1988 and treated with an appropriate primer if required. It is important to understand compatibility of intumescent coatings over primers: if in doubt, consult a manufacturer.
- **Drying times and over-coating intervals:** important in construction sequencing. Together with the thickness of paint that can be applied in one application, this dictates the duration to get a finished application.
- **Sustainability credentials:** as part of adding to a building's sustainability aspirations, intumescent coatings are available as solvent-free and chlorine-free, together with low volatile organic compounds (VOCs).

Intumescent coating manufacturers often work closely with their clients throughout their projects to ensure a product is chosen that fits with the fire resistance rating requirements, meets the durability specifications and aligns with construction timeframes.

Fire Testing and Certification

Regardless of where an intumescent coating is used, it is important that it has undergone rigorous testing to a relevant fire test standard and assessed against a recognized methodology (see Table 1).

Fire protection products require extensive testing, as approval regimes and certification requirements vary across the globe. As an example, a product may be originally tested and certified for use in the UK, but for launch into mainland Europe or China, it will have to be completely re-tested.

Intumescent coating manufacturers are faced with the challenge of tailoring products and marketing strategies to fit different geographic regions.

The size and construction of a fire test specimen would ideally represent the element in its intended position in a building. Typically, loaded beams are tested horizontally, with protection applied to three sides and with the top flange directly in contact with a floor slab. Columns are tested vertically, with the protection applied to all sides. This leads to the terms "3-sided" and "4-sided" exposure when dealing with fire protection to steelwork.

As an example, within the UK and Europe, a test programme for unloaded sections is required to explore the relationship between fire resistance, dry film thickness and section size. A typical programme may include at least 10 sections. To address the issue of adhesion to the substrate (stickability), additional tests are required to complement loaded member tests.

Methods of assessing the performance of fire protection materials have been developed which enable the thickness of protection for a wide range of situations to be predicted, based on a limited number of tests as defined in a fire test.

Following a programme of fire tests on both loaded and unloaded specimens, a mathematical procedure is applied to the results, which enables predictions of required thickness to be made.

Certification bodies act to provide confidence that an intumescent product not only complies

Table 1: Selected fire test standards and their typical countries of use

Fire Test Standard	Typical Countries
BS 476 Parts 20 and 21	UK, New Zealand, Middle East, India & South-East Asia
UL 263	USA, Canada, Middle East
EN 13381-8	Mainland Europe
AS 1530.4	Australia
GOST	Russia
GB 14907	China

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with the minimum regulatory requirements, but that it also meets a stringent set of requirements. Independent third-party certification provides a quality mark that is designed to enable manufacturers to clearly demonstrate the superiority of their products versus non-certified products. Additionally, these bodies can include type and audit testing conducted on independently sampled products and independent factory production control inspection.

Looking to the Future

AkzoNobel's International Paint business aims to provide its customers with more efficient fire protection solutions. The company also strives to offer environmental and sustainability leadership, whether through lower-VOC products, reduced carbon footprint or the use of bio-renewable materials.

Future work will focus on establishing new technology platforms to support product development. With this in mind, International Paint has established a Fire Protection Centre of Excellence with a €7-million state-of-the-art fire protection laboratory that was opened at Felling in north-east England in June 2011. This lab aims to promote technical leadership and push the boundaries of intumescent coatings to develop innovative, safe and robust fire protection systems, tested to align with the needs our clients.

The lab contains two screening furnaces, two 1.5 cubic metre furnaces and a large 4-metre by 3-metre by 2-metre floor furnace with the capability of testing loaded beams. It also houses paint development labs, dedicated paint spraying facilities and environmentally controlled conditioning areas. Up to ten fire tests per day can be accommodated within the new development, including bespoke fire testing to suit customers' needs.

The new laboratory already works closely with the company's Marine & Protective Coatings Technology Centre, also based at Felling, to understand the physical and chemical processes during the intumescent reaction and to investigate new materials. In addition, it has collaborations with operations in AkzoNobel's Functional Chemicals group and its Material Physics expert capability group, as well as a number of universities that are providing expertise in structural and fire engineering.

Summary

Intumescent coatings provide a proven method to achieve a required fire resistance rating for a structure. Before a specific coating can be chosen, however, it is important to ensure that the coating meets the specifications and is fit for purpose.

Understanding global and local fire safety legislation, fire testing requirements and product performance is key. Intumescent products are subject to extensive testing to a wide range of global test standards, and these tests and their associated assessments, together with independent third-party certification, provide confidence that a product will be fit for purpose and meet expectations.

The market for intumescent coatings is estimated to be approximately 50 million litres per annum and it is growing strongly. But despite the technology being well established, there have been relatively few new technologies developed in the last 10 years and there remains the need for innovation to produce more effective and environmentally friendly systems. IFP

Dr. Allan Jowsey is Fire Engineering Manager for International Paint

For further information, go to www. akzonobel.com

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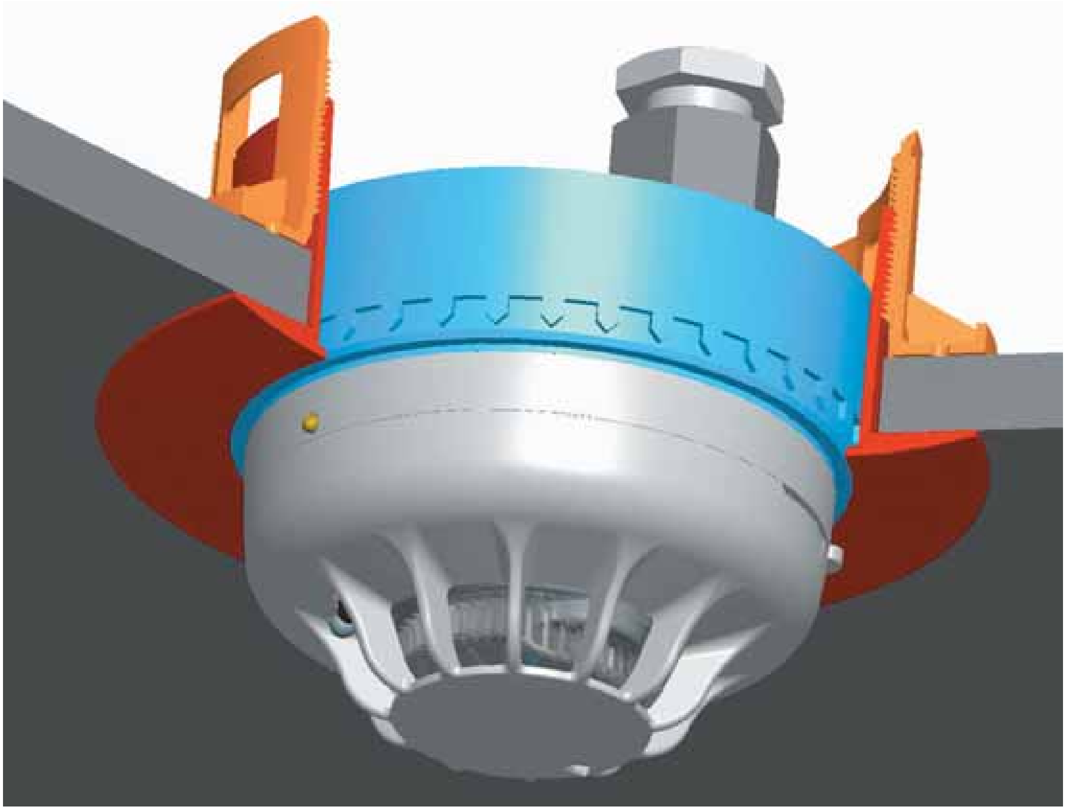


Over the years there have been many key stages in the development of fire detection and alarm systems. Some have been quantum leaps forward such as the first sounders on the loop or the ability to accurately detect carbon monoxide; others have been more subtle changes.

Peter Lackey

ADT Worldwide

Manufacturers always strive to make a difference, but what is the difference? What aspect of functionality or price gives real value for money? Should we concentrate on the installation phase or service issues? Or should we state that our systems are less prone to false and unwanted alarms, or offer superior reliable detection?

Why not consider the needs of everyone and everything? If there was a system that had component parts, software and innovations that had something for everyone connected to the specifying, design, installation and ownership of fire detection and alarm systems it would be a versatile system. Modern systems can do just that to a greater or lesser degree and what I would like to do here is outline some of the things that can make a difference by maximising the investment in technology rather than wasting money on cable and labour costs.

There are many considerations when specifying a system:

- Adherence to legislation.
- Aesthetics.
- Cause and effect programmes to match the changing risk.
- Reliability.
- And of course, price, particularly across the lifetime of the system, which should be a minimum of 20 years.

Installers have health and safety costs to consider while working on site. The fewer personnel, and the less working at height, the better. Time is critical. There is no room for waste or error. Final accounting and documentation are also important.

Owners – the end user – need to be able to use their system as part of an overall fire safety strategy and understand what it does. They need to cost effectively make changes, stay legal and get value for money from both the system and service provider.

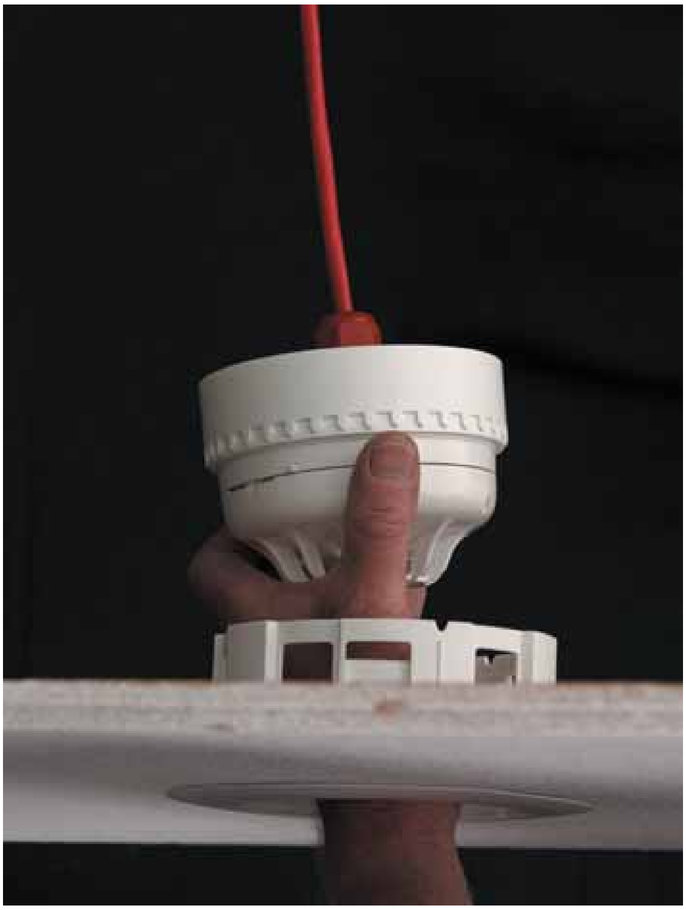
Even after the system has been compared with others, specified, designed and installed, commissioned and serviced there is still no guarantee against a devastating fire. Even a non-fire event can seriously affect the operational efficiency of a business. Based on risk assessment, regularly reviewed, we can minimise the likelihood of a hazard becoming an event. But there are no certainties.

Let us for a moment consider some issues linked to fire alarm systems:

- The spread of fire and the use of fire doors to contain the danger.

nology

- The cost of working at height.
- The cost and time involved in preparing handover documentation at commissioning stage.
- Using the fire alarm system for non-fire events.
- Detector lifetime.
- Weekly sounder checks.
- Seamless integration.



The Spread of Fire

A recent British Standard (BS7273-4 Actuation of release mechanisms for doors), places risks into defined categories depending on the potential level of danger in a fire. Recognising that containing fire spread is critical to life safety, especially in sleeping risks for example, the highest and most demanding level of fire door actuation control is a Class A configuration. The demands are a very high level of monitoring of all aspects of the fire door control, instigation, power, cabling and components plus weekly testing of the operation of all doors.

The installation should be simple with non-complex programming and provide ease of use. The chosen method needs to minimise wiring, relays, timers and other separately wired components. The system should facilitate the manual closing of all doors from a single point should the building occupier so wish, say during the night.

The ADT MZX Technology systems utilise one single interface (the TSM800) that sits on the loop and fully meets all demands of a Category A fire door requirement with low installation costs and simple programming. The unit can even report back to the control panel that all doors have closed alerting to the fact that a tea trolley or other obstacle may have prevented the door closing fully. This is a good example of a development using technology rather than cable and labour to reach a solution.

Working at Height

A topical issue with contractors is the amount of time and cost that has to be built in to a project to allow for health and safety.

Reducing the time taken during installation, coupled to keeping men on the ground, negates the need for access equipment with all the associated cost reductions. 'No Climb' products have led the way in producing a range of innovative pole-mounted test equipment suitable for both commissioning and servicing of detectors. Other complementary developments are being launched by other companies, which are also aimed squarely at the installation phase of works.

ADT has launched a patented way of installing detectors in one visit. The back boxes, bases and heads can all be installed by one man, in one visit and left hanging prior to any false ceiling being fitted, thanks to their new ceiling tile adaptor. The adaptor is a unique way of fitting a plastic profile into a standard 127mm hole in the ceiling tile, into which the detector arrangement is then pulled down and clipped. This is carried out by the ceiling tile fitter and saves a considerable amount of time and potential damage to interlocking tiles when trying to find bases above the suspended ceiling.

Another major leap forward when saving manpower and access is the use of remote infra red to communicate with detectors already fitted in place. Using a hand-held communications management tool, the engineer merely points at the device in question to address and programme it. A message is automatically sent to the control panel, which acknowledges the device status and sends a confirmation back to the engineer on the ground. It is a one man means of commissioning a system accurately and quickly. Once the infra red tool has done its job, the No Climb tester is brought into play to finish setting the detector to work.

Generation 6 Detection Technology from ADT delivers just this. Another fine example of using technology instead of labour.

Handover Documentation

Following on from the previous example, the really clever part of the ADT detection commissioning

process involves the collation of handover documents. As the infra red management tool goes around the system doing its thing, it is learning the type and configuration of individual devices and electronically collating relevant data sheets, test results and all the required documents for the handover of a system. By the time the commissioning engineer gets back to the control panel everything is on a stick ready to be given to the customer. The only thing missing is the 'As Fitted Drawings'. No more waiting three weeks for a bundle of stuff to arrive through the post. Need another copy? No problem, it can be emailed across by return.

Non Fire Events

Do you have a boiler room that needs to be protected against unwanted gas emissions? What are your options?

Normally you would have to fit a separate control panel and gas detectors and cable all the way back to a point where the signal could be received and acted upon. But why not use the fire alarm cabling that is already installed? Fit a 4-20mA loop interface unit, connect that to any industry standard gas detector and the interface unit acts as the gas detection control panel. Any event signal is then automatically relayed back to the fire alarm control panel. Plus there is only one maintenance contract and one product and service supplier to source.

Detector Lifetime

End users/owners of fire detection and alarm systems should be aware that there are products available on the UK market that offer, as standard, a ten year lifespan for carbon monoxide detectors and 20+ years for other detectors. Using the highly acclaimed Dynamic Drift Compensation technique, ADT Generation 6 Detection Technology devices will give many more years of reliable service (typically 20 to 22 years). Another example of wisely investing money into dynamic technology linked to cost of ownership, rather than having to replace devices every few years.

Weekly Sounder Checks

What can be more onerous and disruptive than the fire alarms sounding intermittently for 30 minutes or more during the weekly test? On/off, on/off. . . . Everyone hopes that this is the last time they will sound. But what if there was a means of testing every sounder whether loop powered, those direct from the sounder circuits, or sounder bases, in one 15-second burst and that is it?

What if that test produced a report at the control panel giving a status check on the output and operation of every individual sounder irrespective of the number fitted on the system? It may sound too good to be true, but not with the Reflective Sound Monitoring option from ADT.

Seamless Integration

Much has been written about open and closed protocols. It follows that if you require a simple, no frills technology, bought over the trade counter and fitted by an electrician who may or may not be experienced in fire alarm design criteria then a perceived 'open protocol' system might suffice. If you want anything more sophisticated that can really protect everything plus offer cost savings both in installation and service and not false alarm every time the toast burns, then something more needs to be considered.

Move over to the dark side for a minute and think about a seamless single manufactured system. It makes perfect sense to place your trust into the hands of professionals when it comes to choosing a fire alarm system from a supplier who also offers design, project management, commissioning, handover, training and service of their own, manufactured complete solution, directly to the end user.

What better way to guarantee total peace of mind than choosing a supplier independently accredited to either SP203 or LPS1014 as a mark of competence that also offers a product that carries not only the usual LPCB approvals but an EN54-13 accreditation as well.

What is EN54-13? It is specific to the requirements for compatibility and connectability of system components. It proves that your chosen system maintains its integrity when connected to other systems (critical for a life safety/business continuity system when thinking about utilising it for non-fire events). It ensures that the components of the system are compatible and their performance is guaranteed.

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However, few manufacturers or suppliers can claim EN54-13 in their list of approvals. MZX Technology from ADT is one that can. Maybe the fact that it is vilified as a 'closed protocol' system negates the fact that anyone investing in the technology are definitely putting their money into technology and not cable and labour! IFP

Peter Lackey is Fire Product Marketing Manager (UK) at ADT Worldwide

For further information, go to www.tycoint.com

Matthew Schumann

Rob Wakefield

Underwriters Laboratories

Fire Resistant Testing – Past, Present and Future

As far as fire resisting doorsets are concerned, and to borrow a line from Bob Dylan, the times they are a changin'- at least in Europe.

This article sets out to explain the historic development of fire door standards, how that has shaped where we are now and what the future may hold for the industry. It looks at fire door specific testing and installation requirements in North America, Europe and countries that use their building codes, and how on-going product certification will shape what the industry uses for compliance in the future.

North American History and UL's Role in Fire Door Testing

It is fitting that the development of the early test methods for fire doors in the US occurred in Chicago, Illinois as the city was the site of one of the more economically devastating conflagrations that occurred in the US during the nineteenth century. To showcase the city's growth as an economic engine in the US and its ability to recover from the Great Chicago Fire, Chicago hosted more than 21 million visitors during the World's Columbian Exposition that was a World's Fair held in 1893. The fair showcased many new technologies to the world, including electricity.

With electricity, came the proliferation of DC circuits and the new, higher voltage AC currents, which subsequently caused a great deal of concern and many fires, including several in the Electricity Hall at the Fair.

This growing fire risk due to electricity was subsequently identified by William Henry Merrill, and later, the insurance underwriters located in Chicago. Mr. Merrill felt that this new technology could be safe when handled with the proper care and understanding of its potential hazards. With this goal in mind, Merrill conceived of the idea of an independent testing facility that could provide expert opinions concerning fire hazards and certify

electrical devices. This facility led to the founding of UL in 1894 when Mr. Merrill established the Underwriters' Electrical Bureau and Electrical Bureau of the National Board of Fire Underwriters. Within five years, the organisation moved into other areas of testing and evaluation including fire extinguishers and more importantly for the scope of this article, fire doors.

The start of fire door testing by UL began in 1901 when the organisation built its first fire testing furnace and changed its name to Underwriters Laboratories Inc to reflect the larger scope of the organisation. The first UL specific test standard for a product was issued only two years later when the first Standard for Safety, "Tin-Clad Fire Doors" was issued. This Standard continues to exist today, one-hundred and eight years later as ANSI/UL 10A that still concentrates on tin-clad doors. The result of these events have meant that UL has been tightly linked to the testing and certification of doorsets in the US and Canada since the early days of the company.

North American 'Codes'

Parallel to the development of UL was a development of various North American groups and associations. These became responsible for developing and owning the codes that were being written as building progressed in North America. They included many aspects of building regulation from plumbing to electrical aspects and, critically, fire safety aspects also. The regulations were generally written by consensus groups, including the input of manufacturers, and then adopted by government groups.

Briefly the main groups that came into being over the past one hundred years and still have relevance in current codes are:

- International Code Council – ICC.
- National Fire Protection Association – NFPA.
- National Building Code for Canada – NBCC.
- American Society for Testing & materials – ASTM.

It is these codes that form the basis for building safety in North America, and increasingly are used around the world for new buildings.

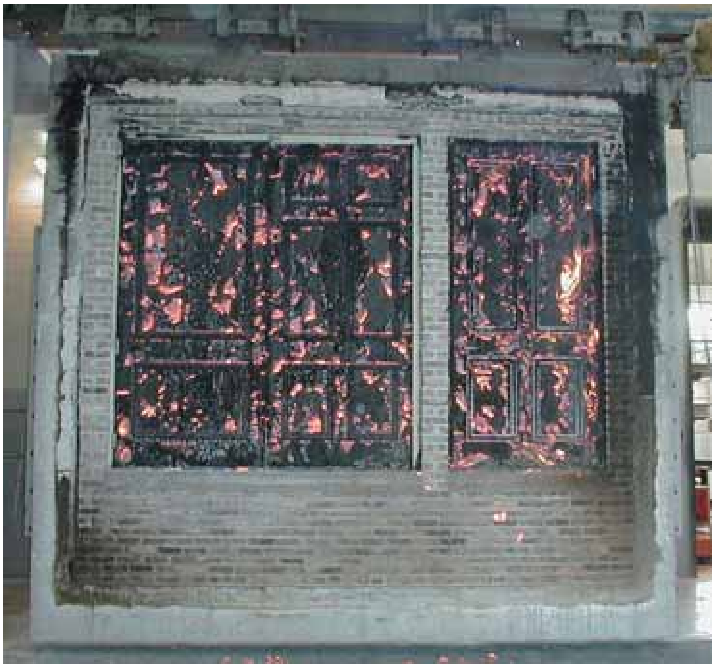
European History

In many cases, for manufacturers of construction products selling into Europe, the system has been far from clear – especially fire doors. The individual countries have implemented national regulations based upon national tests and in many cases there were differences in the requirements; some of these subtle, some differences more significant.

With the introduction of European harmonisation via the Construction Products Directive certain products were able to obtain a CE mark to show compliance with European directives. In order to obtain a European certification mark (a CE mark) for fire doors a producer will need to show compliance against a product standard.

This has been long in the making and the estimated completion date or 'date of availability' has been pushed back a number of times. It seems, in many cases, producers have lost all faith in the system. In fact, while many countries have moved their Regulations over to be based on European Test Standards, the complete system of certification based on CE marking has been completely absent for fire/smoke doors. This hiatus is about to change as the Product Standard is expected in 2013. Together, with the advent of the Construction Products Regulation (CPR) at a very similar time to the completion of the product standard (EN 16034), producers of doorsets will be moving towards European certification based on a CE mark. To reiterate, this will become a reality in the near future and the industry is beginning to gear up to address the demands that this brings.

So how do the two systems compare as far as fire doors are concerned; the long established North American based codes and the soon to be introduced European system for CE marking based on EN 16034?



Test Methods

Historically there has been no firm connection between the development of the North American based codes and the European system. This is despite both regions being involved in International Standardisation activity via ISO. To date any harmonisation activity has not reached as far as code development and certainly not as far as fire/smoke doors. This has led to differences in the test methods that underpin both systems.

The heating regimes for the test methods are both based on ISO 834 from many years ago but there the similarities end. The U.S. codes reference ANSI/UL 10B & ANSI/UL 10C for the fire testing of door assemblies and Canada uses ULC/CAN4-S104. The ANSI/UL 1784 standard is used to test smoke control door assemblies for the US market since Canada does not require this type of testing for doorsets. These tests contain major differences, which translate to critical aspects, from the European test methods; EN 1634-1 and EN 1634-3 for fire and smoke doors respectively.

Two of these critical aspects are the pressure within the furnace chamber, which can be positive or negative, and the use of a hose stream test to measure the remaining 'robustness' of the door after the fire test duration.

Furnace Pressure

UL10B & UL10C are similar to each other in many ways, but the key difference is furnace pressure, which differs in that UL10C requires a positive pressure above 1 metre height (neutral at 1 metre above sill) whereas UL10B and ULC/CAN4-S104 requires the furnace chamber to have a neutral pressure at the top of door assembly. The furnace pressure can have a major effect on the performance of the doorset, particularly for timber based doors, so a degree of consistency would be a major benefit to those manufacturers who need to develop doors to both sets of codes.

The negative pressure within the whole of the furnace chamber is something that has never existed in the European Standard. In EN 1634-1, the furnace pressure is neutral at 500mm; dissimilar to UL10B, UL 10C and ULC/CAN4-S104! The negative furnace chamber pressure is being slowly removed from codes in the US although it still exists in some locales, which have not adopted the IBC and in Canada, which does not utilise positive pressure testing in any form for doorsets.

Hose stream

The hose stream test is intended to ensure that fire resistant building products cannot easily be penetrated by other building materials or furnishings during a fire. The test, in the form of a stream of water, at a constant amount of force, is uniformly applied to all portions of a door, wall or glazed assembly for a calculated duration. The duration and pressure of the hose stream test increases with time as products rated less than two hours are subjected to a 207 kPa (30 psi) hose stream and more than two hours are subjected to a 310 kPa (45 psi) hose stream where the pressure is measured at the base of the nozzle. The duration of the hose stream increases based upon the size and rating of the assembly as the duration is calculated using factors that increase with time and the square area of the assembly being tested.

The hose stream test has been conducted by UL since the 1920s when it became a replacement for the sand bag pendulum test. Originally, fire resistant doors, glazing and walls were subjected to the impact of a sand bag swung into the assembly to ensure that the product would not break after being exposed to the fire test. Product manufacturers took note of the sand bag test and began to reinforce the area of the impact to ensure better results. Seeing that products were being designed to meet the impact and not the intent of the standard, which was to ensure that the product was a rugged barrier over the entire product and not just one area, the hose stream test was developed.

This means that doors and other products that are to be used in vertical applications must be tested to the hose stream test to receive any classification to a UL or ULC Standard. The only exception permitted is for 20 minute rated doors intended for use as smoke barriers and installed where the IBC has been adopted.

The implications are that products designed for use outside North America often need some redesign or additional features added to achieve similar ratings in the US to what they might possess in other markets. As a result, ratings do not exist for products such as 60 minutes Integrity only toughened glass or unlatched doors held closed only by closers. Additionally there is a need to choose hardware products and components much more carefully and all tests for hinged door

leaves are usually conducted with positive latching devices installed.

Installation

Another significant area of difference is in the aspect of on-site work.

In North America, and other countries that reference the International Building Code, NFPA 80 (Standard for Fire Doors and Other Opening Protectives) and NFPA 105 (Standard for the Installation of Smoke Door Assemblies) have become widely referenced and widely adopted as installation standards for fire doors, fire windows and smoke door assemblies. The IBC, NFPA 101, local regulations and UL Certification Information all directly reference these documents as they are the definitive North American standards on product installation and use.

These standards cover requirements for marking, regular door inspection and maintenance, common installation methods, common industry terms and hardware requirements for products. These installation standards are specifically referenced in NFPA and IBC Code Documents and are seen as "best practices" for fire doors and smoke doors and they also define component use for fire rated door and window assemblies. They are used as evaluation criteria by Authorities Having Jurisdiction (AHJs) to determine compliance for proper installation and therefore act as a primary building code regulation for fire doors.

European standards have not gone as far as the IBC and NFPA with the requirements for installation of fire doors, preferring to leave this to national regulations rather than make it a European matter. The European 'codes' address products up to the factory gate and once outside the manufacturer, they become subject to local regulations.

Europe has not gone as far as the IBC and NFPA with the requirements for installation of fire doors, preferring to leave this to national regulations rather than make it a European matter. The European 'codes' address products up to the factory gate and once outside the manufacturer, they become subject to local regulations. As a result there are many differing installation requirements across Europe for fire/smoke doors ranging from quite firm and tight requirements based on the certification of the installed assembly, involving independent third-party certification, to very little or no control over the installation. There are moves to change this. For instance in the UK there is already a move for much tighter controls and, although voluntary at this stage, take-up of the voluntary certification for installation seems good despite many years of false dawns.

For the time being however, the differences remain strong between the two systems as far as installation of fire doors is concerned.

UK system

However, there are a number of complications – not least the culture of doorset fabrication in UK and some other countries. In these cases, doorsets are defined as a complete doorset including door frame, door leaf or leaves, building hardware, seals, glass etc., is often not what is bought. The complete doorset often only comes together on-site, that is at the time of installation. As the product standard EN 16034 only covers complete doorsets for CE marking, the UK type situation of components being placed on the market means that most 'doors' will not be able to be CE marked unless this is addressed by the installer. Given that there are not that many specialist installer companies for fire doors it is difficult to understand how these will be covered. This leaves a situation in many countries where some doors will be CE marked, that is, subject to the EN standards and the increased rigour above national test methods that these bring, and some being based on national standards as they are not able to be CE marked. A situation that many people would agree is wholly unacceptable in moving towards a level and transparent marketplace.

The Future

So now it should be clear to you why the codes came into being, which bodies are involved in the development and ownership of the codes and how they will impact on doorsets.

For the future, it is clear that these 'International' codes will continue to be used for countries outside of North America as the buildings are built by North American finance, designed by North American trained architects, influenced by readily accepted and consistent 'American' or 'North American" (usually NFPA or IBC sourced) codes and standards – which are increasingly becoming true International codes and standards.

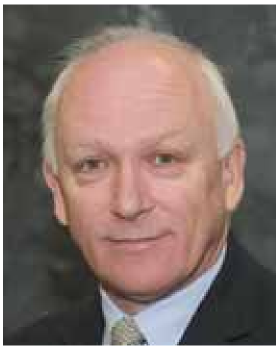
Test Standards in North America will continue to be developed to align with North American codes. These Standards will continue to differ from European standards. There is no intention or move to harmonise the US based codes with European regulations. This means that the need for certification of doorsets against the Standards referenced in the 'International' codes will continue and, as the US codes are often used in emerging nations, their use will increase, especially in Middle Eastern and Asian countries. It is likely then that if you export you will continue to be asked about meeting these requirements.

To address these difficulties in seeking product certifications for different markets, UL has developed a combined fire door test method that can be used to test against US and EN standards in one test program. This means that a producer of fire doors can conduct a fire resistance test and use that test evidence for UL certification purposes as well as CE marking (when it arrives for fire doors) and even some national Standards gaining multiple results at the same time. IFP

Matt Schumann, Engineering Lead, UL – Northbrook, IL USA
Rob Wakefield, Engineering Associate, UL Warrington

For further information, go to www.ul.com

Installing Fire-res Dampers



Norman Macdonald

BRE

The recently published BRE Good Building Guide 81 – *Installing fire-resisting ductwork and dampers,* provides a simple introduction to the key fire-related parameters that govern the correct installation of fire-resisting duct and/or damper systems when passing through fire-resisting walls, partitions and floors.

A critical weakness in the fire safety of any building can be the penetration of fire compartment walls and floors by building services such as cables, pipes and ductwork, including dampers. Potential fire spread via a ductwork system is of particular concern as it is designed to distribute air throughout the building. A fire attacking such a system that is not designed and installed properly has the potential to spread fire, smoke and toxic gases rapidly to more than one compartment within the building with consequences for life safety and property protection.

Penetrations through Walls and Floors

When considering the fire performance of a fire-resisting duct or damper, specifiers, contractors, and approval authorities often forget the importance of the design of the wall, partition or floor that the duct or damper is penetrating. When BRE and other fire laboratories test fire-resisting duct systems, we find that the fire performance of the duct will vary depending on the type of wall or floor they are passing through. Their performance will also depend on the size and type of fire-stopping used to seal any gaps around the duct as it passes through the wall or floor.

For example, a masonry wall will remain rigid in fire conditions but the duct may expand or shrink. This differential movement can have a noticeable adverse effect on the fire-stopping seal at the wall penetration. If the duct is passing through a steel-framed partition, the partition will tend to bow towards the fire. Depending on the type of fire-resisting duct this may lead to an even greater differential movement at the wall penetration.

Penetration sealing systems that work well in small gaps and/or with other types of service penetrations may not perform well when used to seal larger gaps or with excessive differential movement between the duct and the wall, partition or floor.

Similar problems can occur with fire-resisting dampers. An additional consideration with dampers is the amount of support and restraint they obtain from the wall or floor they are installed into. If a damper has only been tested in a masonry wall it may not be suitable for installation in a steel-framed partition. A masonry wall will provide good support and retain the damper frame in position. An incorrectly installed damper within a steel-framed partition may result in the damper frame twisting and preventing the blades closing as required.

An incorrectly installed damper also applies a

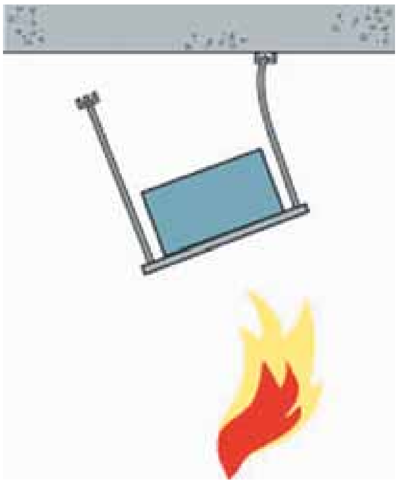
isting Ducts and

load on the non-loadbearing partition. Therefore it is clear that the duct or damper must be installed in practice with a fire-stopping system that has been shown by test to work successfully with the appropriate duct or damper system and with the appropriate type of wall, partition or floor.

Unfortunately it is common for tenders for projects to separate the installation of the fire-stopping, walls, ducts and dampers and the contractors installing the separate systems rarely communicate. This frequently results in critical weaknesses in the finished system. For example, ducts passing through coated mineral wool fire-stopping systems that have never been tested with ducts or dampers, or dampers mounted in non-loadbearing partitions without any hangers to support the damper.

Therefore it is very important that the damper or duct manufacturer or supplier provides the main contractor with detailed drawings of successfully tested or assessed methods of dealing with penetrations through walls, partitions and floors. The main contractor can then pass this information on to the fire-stopping contractor to ensure he uses the correct products and installs them in the correct manner.

Supports for Ducts and Dampers



As discussed above, the amount of support and restraint provided for a fire resisting damper is important to ensure its fire performance. Similarly, fire resisting ductwork must be supported well along its complete length to ensure that the duct does not collapse or sag excessively in fire conditions.

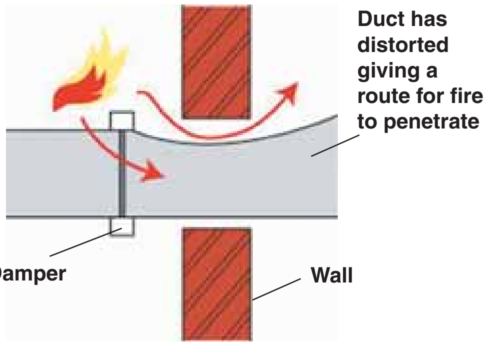
Care must also be taken that the support system for ductwork is adequately secured to a structure that has at least the same fire resistance as required by the duct. For example, it is a waste of time installing a fire-resisting duct system if it is suspended from a non fire resisting roof structure. In addition, one must ensure that adequate non-combustible anchors are used with the hangers of horizontal runs of ducts. Some manufacturers of anchors have now demonstrated by test that their

anchors will continue to support the applied load in fire conditions.

Size is Important

The fire performance of a duct or damper may vary with size. Generally the larger the duct or damper the more difficult it will be to perform well in fire conditions. Therefore the specifier and installer of fire resisting ducts and dampers must ensure that they are not using a system that exceeds the maximum permissible size.

Position of Damper in Relation to the Wall or Floor



The location of the damper in relation to the wall, partition or floor is important. Unless shown by test to be suitable, fire-resisting dampers must be mounted within the thickness of the wall, partition or floor. If they are located elsewhere, they will not perform as required as the fire will attack the length of non-fire resisting duct passing through the wall or floor and quickly pass through to the next room.

Liaison Between Stakeholders

These are only a few of the several design features that one must consider when specifying, installing and inspecting fire resisting duct and damper systems. Therefore when installing fire-rated

ductwork and/or dampers, it is vital that there is good liaison between the following stakeholders for the complete duration of the project:

- Specifier.
- Heating and ventilation engineer.
- Fire consultant/engineer.
- Approval authority.
- Installer of each system.
- Manufacturers or suppliers of the wall, partition, or floor system.
- Manufacturers or suppliers of the duct/damper.
- Manufacturers or suppliers of the fire-stopping system.

Third Party Certification and Workmanship

Third-party certification schemes for the production of fire protection systems and for their installation on site can play an important role in ensuring the correct design and installation of fire-resisting ducts and dampers. In the absence of such schemes there will be some doubt whether the product tested is the same as the product/system currently marketed. The installer scheme will enhance confidence that the systems have been installed correctly.

The Loss Prevention Certification Board, LPCB, which is incorporated in BRE Global, operate third party certification schemes for manufacturers (LPS 1162-*Requirements and tests for LPCB approval of fire dampers)* and installers (LPS 1531-*Requirements for the LPCB Approval and Listing of companies installing or applying passive fire protection products)* of fire-resisting ducts and dampers.

Maintenance

The final item that is often neglected is the maintenance of fire protection systems during the life of the building. It is the responsibility of the building owners or facility managers to ensure that regular checks and testing must be carried out and recorded to establish that the fire-resisting ductwork and penetration seals have not been damaged and that the dampers will operate when required.

The frequency of these inspections will vary depending on various factors. In the UK, further guidance is given in BS 9999: 2008 and in the guidance documents supporting the Regulatory Reform (Fire Safety) Order 2005. The manufacturer of the duct, damper and/or fire-stopping system should also be able to provide advice.

Conclusions

This article has briefly discussed some of the key fire-related parameters that govern the correct installation of fire-resisting duct and/or damper systems when passing through fire-resisting walls, partitions or floors. The topics raised in this article have been considered in more depth in the recently published BRE Good Building Guide 81, *Installing fire-resisting ductwork and dampers,* available from www.brebookshop.com. The guide is designed as a simple introduction to the subject, with useful illustrations and photographs and references to more comprehensive documents.

It is clearly important that any ductwork or damper system that penetrates a fire-resisting wall, partition, or floor, is properly fire tested, classified and assessed by a suitable independent body, taking into account any variations from the designs of the test specimen, the fire-stopping, and the surrounding wall, partition or floor. If any party involved in the building project notes that a particular detail is not already covered in the supporting test, classification or assessment documentation for the duct or damper, then they must bring the matter to the attention of the manufacturer or supplier and the installer of the duct, damper, or fire-stopping system and the proposed alternative detail considered by a suitable independent body such as BRE.

Regular liaison between all the parties involved with the specification, design and installation of the systems is essential to ensure the duct or damper operates properly with the wall or floor and the fire-stopping system.

Third-party certification schemes for manufacturer/suppliers and installers such as those operated by the LPCB are a useful tool in ensuring that the correct combination of fire protection products and systems are properly installed. As with all fire protection systems, the responsible contractor must pass on all relevant documentation to the building owner and the building owners or facility managers must establish a sound maintenance regime to ensure the continued safety of the building. IFP

Norman Macdonald is Principal Consultant at BRE

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Developments in Alarm Technology

Neil Young

Cranford Controls

Voice and spoken instructions greatly reduce the time taken to evacuate a building after the fire alarm has been activated.

In the early years of fire alarm systems, the sound produced by an electrical motorised bell was the most recognised fire alarm alert signal. Electronic sounders then became more popular due to improved operational characteristics, in particular lower current consumption and greater user control. Electronically generated tones were used to warn that the fire alarm system had been activated and the building should be evacuated. There are now numerous different tones available and therefore we are faced with most countries choosing their own individual tone, thus resulting in no single standard fire alarm tone across the industry.

It has been demonstrated that voice and spoken instructions greatly reduce the time taken to evacuate a building after the fire alarm has been activated. Any alarm can cause members of the public to panic, however a voice instruction relayed in a calm and succinct manner can reassure the public and give clear and precise instructions. This would include large office buildings, superstores and other public attractions with a regular occurrence of visitors who would be unaware of the fire and emergency procedures. Specific voice messages can also be relayed to members of staff or other personnel, resulting in voice being intrinsically more effective than an alarm tone.

We should also take into consideration the increase in the variety of sounds within industrial buildings, such as water/gas leakage alerts, machinery shutdown and other general warning sounds. This makes it difficult for personnel to differentiate the fire alarm alert tone from these other sounds and therefore the reaction time to respond appropriately would be significantly delayed. A voice system could be set up to automatically output the correct message to appropriate staff and instruct them on how to proceed.

The evacuation procedure in large public buildings can often be very complicated. This is made worse with multiple fire exits and indiscriminate signage, creating panic and disarray as hundreds of people attempt to evacuate the building. An advantage with a voice-based alarm system, in this situation, is the ability to set up different messages that are appropriate for different areas within a building. For instance, in the event of an alarm they are automatically able to instruct people to the nearest exit quickly and without confusion to enable a safe and timely exit. Additional instructions could be added to the message such as "Do not use the lifts".

Voice Alarm (VA) Systems versus Voice Enhanced Sounders

At this point, it is important to distinguish between two different approaches to applying voice to fire detection and alarm systems.

A voice alarm (VA) System is a specifically designed sound distribution system that broadcasts voice messages. It is normally connected to alarm outputs from the fire detection system with dedicated control units/equipment, amplifiers, microphone options and loudspeakers. A voice enhanced sounder is an individual electronic sounder that is specifically designed for voice messages and is connected directly to the alarm output or to the detection loop of the fire control and indicating panel.

Voice-based

It is important to recognise the difference between voice enhanced sounders and VA systems in terms of their applications and practicalities. In large places of assembly such as train stations, airports and shopping centres it is often the case that a VA system is installed to give additional public announcements such as flight arrivals or specific information. It is then more appropriate to utilise the same system in the event of an emergency to continuously update the occupants of the building as to the situation and instructions on how to proceed. Alternatively, this type of system could be used to broadcast subtle or 'coded' messages from the announcer to members of staff, alerting them to a situation and also by the emergency services to aid the evacuation. Many airports and other large public buildings implement public address (PA) and voice alarm (VA) hybrid systems providing the ability to communicate to any member of staff or the public depending on the circumstance.

Voice enhanced sounders are used as an alarm device that is directly connected to the alarm circuit of a fire detection system. They are normally standalone units which automatically play a voice message when the system operates and hence are generally easier to install. Voice enhanced sounders can be used in a wide variety of different applications from the small shops and offices right up to large buildings and complexes.

VA systems and voice enhanced sounder systems can vary significantly in price. VA systems tend to be more complicated by having networks of loudspeakers, microphones and all manner of sophisticated communications equipment, whereas voice enhanced sounders are connected directly to the fire control and indicating panel. The difference here is that the cost of a voice enhanced sounder system can be more cost competitive than a VA system. For fire safety integrity reasons, both a VA system and a voice enhanced sounder system should be fitted using fire resistant cabling.

Standards

In recent years standards have been developed and improved for both voice sounders and voice alarm systems.

The European standard EN54-3 "Fire Alarm devices – Sounders" was extended in 2006 to include voice enhanced sounders, to encourage the development of higher quality voice sounders. This has subsequently increased their prevalence within the industry. In 2008 two standards were published, EN54-16 "Voice alarm control and indicating equipment (VACIE)" and EN54-24 "Components of voice alarm systems – Loudspeakers". At ISO level, the equivalent ISO 7240-16 for "Sound Systems Control and Indicating Equipment" and ISO 7240-24 for "Sound Systems Loudspeakers" have also been developed.

In addition, national codes of practice have been revised to follow technology and application of VA systems. One such example is BS5839-8:2008 "Code of Practice for the design, installation, commissioning and maintenance of Voice Alarm systems". In this 2008 revision, it also recognises the role of voice enhanced sounders in a VA system. By setting new standards for the product and its installation, designers have been able to implement them into their systems with more confidence due to their qualified safety, efficiency and intelligibility measures. Many voice sounders can be seen in the marketplace today and have proved particularly successful in many applications in the UK and around the world.

As well as this, the system designer must consider disability discrimination legislation, making sure that there are sufficient visual and sound alarm devices that warn the hard of hearing and visually impaired that an alarm is in operation. For this purpose, voice enhanced sounders can incorporate a visual alarm indication in one combined device.

In the support of changes to standards and applications, new courses led by the Fire Industry Association (FIA) in the UK are already addressing this with a new training module on voice alarm

systems. This course will offer training on the important aspects of voice-based alarm systems such as interface training between FACIE/VACIE, creating a voice system design plan to assist synchronisation and much more.

Technology

Technology has made a significant impact, by enabling the combination of voice-based alarm systems with other systems, resulting in a seamless level of building integration and networking. System speech intelligibility has also made large strides forward with improvements to the components within a VA system.

Continuous developments in electronic technology reduces the cost of increasingly more powerful microcontroller IC's with digital signal processing capabilities, ideal for generating good quality voice messages. Memory storage components continue to get physically smaller and cheaper while increasing in storage capacity, allowing multiple higher quality audio files to be stored within a single voice sounder. Customers may choose from a wide range of standard sounds, tones and voice messages in different languages.

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Most manufacturers also offer the option for bespoke messages, allowing a customer to create their own audio files to be uploaded into their voice sounders. This may be programmed during production, or depending on the product, the customer may be able to manually uploaded their own messages from a PC (similar to storing audio files in consumer devices such as MP3 players), or transfer them via a small memory card.

In certain situations, greater control is required over the voice sounder system than simply switching power on and off to the alarm circuit. For instance a tourist attraction, such as a museum, may have occupants of multiple nationalities with differing native languages. It has been speculated as to whether it is appropriate to install a voice system whereby some of the public may not be able to understand the language the message is broadcast in. This would hinder their ability to understand the nature of the alarm, causing unnecessary panic or confusion. By contrast, a tone alarm sounds the same in every 'language'.

However, some manufacturers now offer control units which can transmit sequential messages through a networked system, for example, broadcasting an English message followed by a French message, with a tone separating them. Such systems may also transmit specific messages to targeted voice sounders that are appropriate for the type of alert.

Where synchronicity between voice sounders is

concerned, these control units are able to keep them sounding at exactly the same time – important for intelligibility reasons. For example, large open buildings are likely to reverberate and echo and therefore the intelligibility of a voice sounder will deteriorate over distance, making it especially important for multiple voice sounders in the same space to be kept in synchronisation.

The standard EN54-3 for "Alarm devices – sounders" in Annex C, requires any system that offers a method of synchronisation, to ensure that sounders within 20 metres of each other must remain in synchronisation after 30 minutes of the alarm being activated, with a delay between sounders of no more than 0.02 seconds.

As mentioned briefly, a key concern regarding any voice sounder system is reviewing how intelligible the voice messages are once the sounders have been installed into a location. Factors such as the audio quality of the sound file, the quality of the transducer in the sounder unit, the acoustics of the sounder body, the shape of the room in which the sounder is installed, any background noise present during the time of an emergency, and a system's synchronicity all affect the intelligibility of the voice message.

These are all considerations that must be made by the designer, when planning out the system, but actually measuring the effectiveness of the system can be difficult. However, over the past few years intelligibility measurement techniques have been developed which can make this reviewing process much simpler.

Using STI (Speech Transmission Index) and CIS (Common Intelligibility Scale) measurements, the designer and the installer can confirm that the system they have created has met standards. A CIS level of 0.7 or an STI level of 0.5 (corresponds to comprehension of approximately 80 percent of words and 95 percent of sentences) must be attained. Methods of measuring this will not be discussed here.

Combined, these developments have improved the flexibility of design and the intelligibility of a voice enhanced sounder system immensely.

Conclusions

As in all cases of technology there are challenges to ensure that the voice message has the correct information for the application, that it is intelligible and most importantly that it is effective enough to ensure that it can instruct and evacuate people safely in the case of an emergency situation. In addition, there are increasing demands placed upon on building safety and efficient evacuation procedures in life critical applications.

With the introduction of robust new and revised standards and applications for voice-based alarm systems, this provides solid guidelines for both designers and installers to work to. Combined with technology advancements, the intelligence and flexibility of voice alarm sounder systems has remarkably increased whilst, at the same time, reducing overall system costs. As a result, voice enhanced sounders and VA systems are fast becoming the more popular choice. IFP

Neil Young is Senior Technical and Engineering Manager at Cranford Controls

For further information, go to www.cranfordcontrols.com

Risk Management Buildings

Niall Rowan

Association for Specialist Fire Protection

"The subject of risk management in complex buildings is probably beyond the competence of the average fire risk assessor".

That is possibly a rather controversial statement to make, particularly at the start of an article on risk management in complex buildings, but as more problems with fire risk assessments arise and become widely reported in the press, it is increasingly becoming accepted opinion.

It is well known that under the UK's Regulatory Reform (Fire Safety) Order, there are currently no qualification, knowledge or experience requirements for fire risk assessors. Anybody can do it and, as a result, there are a number of sub-standard risk assessments in circulation. The more infamous assessments have been well documented in the UK press, but what about more complex buildings such as fire engineered buildings? What special requirements do they have that make them "beyond the competence of the average fire risk assessor"?

Fire engineered buildings are complex and offer a lot of advantages to the building owner, the occupier and the developer/contractor, such as:

- Innovative design.
- Extended escape distances.
- Reduced fire resistance periods for the structure.
- Increased compartment sizes.
- Removal of stairs resulting in an increase in the useable floor plate.
- Flexibility in the use of space for the end user.
- Reduced construction costs.

To enable this, fire engineered buildings are reliant upon a number of engineering techniques such as hot smoke extraction systems, smoke venting, smoke curtains, extensive automatic fire detection, fire suppression systems, compartmentation of high risk areas and well defined operational procedures.

Such an approach demands a high standard of fire safety management covering the day-to-day operational arrangements for the building. It also requires a robust planned preventative maintenance regime in respect of fire safety systems. While this is feasible, is it realistic in the day-to-day running of buildings? What happens over time when, bit by bit, small changes are made to the building that compromise or invalidate the fire safety measures that are essential to a fire engineered building working correctly?

The fire risk assessor evaluating a complex building will need to review the fire safety strategy (FSS) in order to be able to undertake a "suitable and sufficient" assessment. While fundamentally accepting its validity, since it will have been signed off by the regulator, the assessor will need to review the FSS for deviations present in the building that will need addressing, either by requiring compliance or developing an alternative strategy. It should be noted that the FSS will often be justified by detailed models and calculations that are outside the scope of a fire risk assessment. They are also likely to be outside the competence of any fire risk assessor who is not a fire engineer.

In order to undertake the fire risk assessment, the assessor will also need extensive support from the Responsible Person because he or she must hold all the information on all the fire safety systems that make the building safe. This will include all the passive fire protection (structural or built-in) measures, all the active fire protection (detection, alarm, suppression) measures and – for complex buildings – the fire safety strategy, including the assumptions made in producing it.

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In England and Wales, for buildings built since 2006, the requirement to maintain such information is enshrined in Regulation 38 (formerly 16b) of the Building Regulations. This requires that information be given to the Responsible Person so that any fire risk assessor can obtain the information from them and undertake their fire risk assessment. Unfortunately, "Regulation 38 information" is rarely available, which makes it more difficult for the Responsible Person and the fire risk assessor to come up with a credible fire risk assessment.

The greater variety of systems in complex fire engineered buildings, such as smoke extraction and pressurisation systems, require detailed PPM programmes. Complex "cause and effect" matrices are often linked to the automatic fire detection. Changes to the building, its usage, or the procedures, may render these inappropriate. Consequently, systems of scheduling PPM and record keeping are very important in ensuring the relevant systems are maintained in working order. The fire risk assessor will need to investigate these as part of his risk assessment.

There are four areas that the fire risk assessor will need to concentrate on in conducting a fire risk assessment on a complex building based on the a review of the fire safety strategy.

1. Review of the building geometry and layout

Has the building layout or geometry been changed from that specified in the fire safety strategy? In particular, has the building been modified? Does the compartmentation and use of the building reflect what is stated in the strategy?

2. Review of fire safety systems

In the same way that all the passive fire protection measures need reviewing, so do the active fire protection measures. Consider the various active fire safety systems, such as fire alarms, smoke heat and extract systems, and fire suppression systems, and ask yourself if the average Responsible Person, or fire risk assessor, can answer the questions related to each.

3. Review of operational arrangements

Operational arrangements covering the management and operation of the building will need to be reviewed as part of any fire risk assessment, specifically to ensure it is in alignment with the fire safety strategy. In doing this the fire risk assessor will have to use his skills and experience to address a number of means of escape issues.

4. Planned preventative maintenance (PPM)

Planned preventative maintenance and the testing of fire safety equipment essential to the fire safety strategy is crucially important in a complex building because the operation of the systems is critical in affording the required level of safety to the occupants.

The greater variety of systems in complex fire engineered buildings, such as smoke extraction and pressurisation systems, require detailed PPM programmes. Complex "cause and effect" matrices are often linked to the automatic fire detection. Changes to the building, its usage, or the procedures, may render these inappropriate. Consequently, systems of scheduling PPM and record keeping are very important in ensuring the relevant systems are maintained in working order. The fire risk assessor will need to investigate these as part of his risk assessment.

Conclusion

This article highlights the many special factors that need to be considered in undertaking a fire risk assessment in a complex fire engineered building. There are a many specialist questions under each of the four areas of: passive fire protection, active fire protection, operational requirements and planned preventative maintenance that need detailed answers. Undertaking such a risk assessment is not for the feint hearted and can probably only be undertaken by a qualified fire safety engineer. IFP

Niall Rowan is Technical Officer at the Association for Specialist Fire Protection (ASFP)

For further information, go to www.asfp.org.co.uk

Protecting Our He

Kenwood House, Hampstead Heath, London

Steve Emery

English Heritage

The UK Fire and Rescue Services are absolutely vital to the protection of our historic buildings from fire. Although there are no statistics, it is likely that at least two high grade historic buildings have a serious fire every month. What is being done to stem these losses?

The whole of our historic environment enriches our quality of life, and contributes to local character and a sense of place; and some historic buildings, monuments, landscapes and areas are of special importance nationally or even internationally.

English Heritage is the organisation that is tasked with protecting the best of our architectural heritage. When buildings are listed they are placed on statutory lists of buildings of 'special architectural or historic interest' compiled by the Secretary of State for Culture, Media and Sport.

The older and rarer a building is, the more likely it is to be listed. All buildings built before 1700 that survive in anything like their original condition are listed, as are most built between 1700 and 1840. After that date, the criteria becomes tighter. Listed buildings are graded to show their relative importance:

- Grade I buildings are those of exceptional interest.
- Grade II* are particularly important buildings of more than special interest.
- Grade II are of special interest, warranting every effort to preserve them.

Fire Fighting in Heritage Buildings

The introduction of integrated risk management plans (IRMPs) – a risk-based approach to fire cover has undoubtedly enhanced emergency risk planning and response for heritage sites. IRMPs enabled fire and rescue services to match the risk with the location of fire stations, number and type of fire engines, and crewing arrangements.

National guidance to IRMPs is provided by the Government's Department for Communities and Local Government (CLG). The guidance for heritage properties explains that: "Fire and rescue authorities are required to produce a local IRMP that sets out the authority's strategy, in collaboration with other agencies, for reducing the commercial, economic and social impact of fires and other emergency incidents. Furthermore, safeguarding the environment and heritage (both built and natural) is an essential component of this strategy."

"While fire authorities have a legal responsibility to ensure that effective arrangements are in place to deal with an incident that could adversely affect the rich heritage of our country through both planning and response, a moral responsibility also exists to ensure that the quality of life of the public is improved through the concept of sustainable development. The protection of built and natural heritage is seen as a core function in an IRMP that is designed to improve the safety of the community."

Gathering information about individual heritage buildings will provide useful construction knowledge

ritage

and help fire fighters safely tackle a blaze there.

Wardington Manor fire (courtesy of Oxfordshire fire and rescue service)

Emergency Planning for Heritage Buildings and their Contents

The flooding in Boscastle, Yorkshire, Cumbria and Gloucestershire and damaging fires, such as that in the Cutty Sark have focussed many minds on the challenges faced in preparing for emergencies in the heritage sector.

There are three important initiatives existing at the moment:

- The London Emergency Planning Group comprising most of the heritage organisations within the M25 motorway around London was set up by the Department for Culture Media and Sport in May 2006.
- A standardised training course for salvage and first aid treatment for water or fire damaged art, together with a standard template for emergency plans has been developed. Courses are held four times a year at the West Midlands Fire Service Academy in Smethwick.
- The Fire and Rescue Service guidance for Integrated Risk Management Plans for Heritage Buildings has been published and is being adopted by many fire and rescue services.

The DCMS London Emergency Planning Group

Members of the DCMS London Emergency Planning Group include the National Trust, English Heritage, the Victoria & Albert Museum, Historic Royal Palaces and the British Museum. The purpose of the group is to prepare business continuity and emergency plans and to provide mutual aid during an emergency.

Members are able to use the DCMS website Agora to securely store their emergency plans, facilitate communications and to create a standard glossary of terms for salvage, emergency planning and business continuity.

The sharing of experiences has been useful and at a recent meeting many organisations had tales of woe concerning flooding incidents. Most of the incidents were the result of contractors' failures while working on water systems, so a 'permit to work on water systems' has been produced for buildings with valuable collections.

During one of the early meetings Professor Graham Matthews identified training as a major need, referring to his research paper: *Safeguarding Heritage at Risk: Disaster Management in UK archives, libraries and museums* The greatest training needs were: undertaking exercises; handling and salvaging materials; selecting and training a salvage team; effective communications and providing service continuity and access.

Salvage Course; Working with the Emergency Services

To address the issues raised by Professor Mathews, a structure for a national training course in Emergency Planning for heritage employees and managers was developed. The parallel need for fire service personnel to receive training in the salvage of historic collections was also identified, so a trial course was held at the Lancashire Fire Services College in December 2008.

The fire ground facilities at Lancashire and later at the West Midlands Fire Service Academy enable realistic exercises to be created, using museum and art gallery collections that have been subjected to heat, smoke and water.

There have been 12 courses to date and the content has evolved to take into account feedback from delegates. This has led to a very hands-on practical course. The highlights of these courses is the walk-through a smoke filled building, dealing with floods and the salvage exercise, which involves working with the local fire and rescue service and matching their command and control with that of the salvage teams.

The course covers three phases:

- Working in difficult situations with the fire service's command and control system.

Salvage course delegate diverting water

Wardington Manor after the fire

- Handling of objects.
- First Aid treatment of objects.

It is not expected that delegates will ever wear breathing apparatus in a real fire, but it gives them an opportunity to see the conditions that a firefighter will experience and the limitations on the opportunity for salvage in the early stages of fighting a fire.

Standardised Emergency Plans

Individual property managers have always been encouraged to write their own emergency plans as they know the property and collection, and it encourages them to assume ownership. While some guidance has been provided, it has led to a wide variety of plans even within the same organisation. One of the main problems has been that the plans contain too much information, not all of it immediately relevant during an emergency.

A framework for writing the emergency plans has therefore been produced, which includes call out numbers, structures for managing emergencies, site plans, building plans and first aid treatment of objects.

The layout for the priority sheets that detail which objects should be removed first always arouses the most discussion. The use of photographs, floor plans and easily read symbols are now considered essential, together with how to remove the object, how heavy the object is and how many people are needed to handle it.

All the pages of the plan are laminated and removable from the file, so that they can be handed to the people who require them.

Fire Safety in Heritage Buildings

The Fire Safety Order

The Regulatory Reform (Fire Safety) Order 2005, which came into force in England and Wales in October 2006 (and similar legislation that has since been implemented in the rest of the UK) was intended to simplify fire safety laws and their enforcement, with a single risk-based piece of legislation. This puts the onus firmly on 'Responsible Persons', such as owner/occupiers or building managers, to provide a fire risk assessment and supporting fire safety measures.

The Order applies to all premises except single occupied dwellings and has been enacted to ensure the safety of people; it does not specifically encourage property protection, particularly the spread of fire from one building to the next. However, there are duties which, in addition to protecting people, will also help protect premises.

Inside the pillar at the front of Kenwood House (shown in the first photo)

Historic objects rescued from Wardington Manor

Supporting Guidance

A series of sector-specific guides have been produced to help responsible persons undertake fire risk assessments in various uses of premises. These documents are supposed to be one way of complying with the legislation, but unfortunately some fire authorities use them prescriptively as 'minimum standards'. All of these government guides contain an appendix referring to historic buildings.

As there are many uses of premises and a limited number of guides, the uses are grouped. For instance, the guide for places of assembly encompasses public houses, clubs, village halls and churches. In theory, this should not cause any problem because a risk assessment should show the differences between uses and the appropriate level of intervention required. But in practice, when responsible persons and enforcers are faced with a low-risk property, trying to match it with the guide for high risk is difficult.

Enforcement Issues

Fire authorities are the enforcing authority for the Fire Safety Order, and most authorities have audited all premises within their area to ascertain the risk profiles for an inspection regime.

They have a number of tools to use when enforcing the legislation, as follows in escalating order:

- Verbal advice.
- Agreed action plan.
- Enforcement order.
- Alterations notice.
- Prohibition of use.

To avoid conflict between the requirements of the Order and any other applicable legislation, there is a duty on fire authorities to consult with the other enforcing authority before issuing an enforcement notice. Failure to consult may result in the responsible person being unable to comply with the fire authorities' requirements without breaking the law, such as in the case of listed buildings.

This consultation should ensure that fire safety alterations are undertaken in a way that is sympathetic with the character of the building and is reversible. Unfortunately, there is no requirement for enforcing authorities to consult when using verbal advice, or an agreed action plan, so some authorities will only use enforcement notices when dealing with listed buildings, to avoid the possibility of responsible persons carrying out work illicitly.

Appeals Process

An appeals procedure is in place for any disagreements between the enforcing authority and the responsible person; if the disagreement is about a procedural or legislative matter, it is heard in a Magistrates' Court; if it is a technical matter that the fire authority and responsible person cannot agree on, it is heard by the Secretary of State.

However, there remain concerns that the legislative shift has actually increased the threat to the significance of historic buildings in terms of inappropriate fire safety measures being adopted – particularly in terms of the practical fire risk assessment guidance produced by government and enforcement by fire authorities.

Conclusion

The legislative changes of the last decade may have improved the response to emergencies in heritage buildings, but there is a risk that they have increased the threats to the significance of historic buildings from inappropriate fire safety measures.

One way of heading off problems would be for local authority conservation officers to make stronger personal links with fire safety officers of local fire services. A great deal of work is being done to protect our heritage from fire, but it is only the beginning; working with all agencies involved will continue and expand to provide benefits for the whole of the historic environment. IFP

Steve Emery is fire safety Advisor at English Heritage

For further information, go to www.english-heritage.org.uk

Latest Developmen

Richard Bramham

Apollo Fire Detectors

The fire detection market continues to evolve in order to meet the needs and expectations of the end user.

As buildings become more sophisticated, fire detection technology must keep pace in order to continue to accurately and reliably provide warning of fire. One of the biggest challenges for fire detection product manufacturers is to predict what new technological demands will emerge, and to develop timely solutions for them.

It's Good To Talk

There is increasing demand for products that interact with one another without the need for specialist knowledge on the part of the user. People assume, with some justification, that if their mobile phone can talk to their home computer and car entertainment system then there should be no problem getting their security system and fire alarm system to work together as well.

Buildings today can have any number of systems installed in order to control security, heating, lighting and ventilation. Controlling all of these systems through a common interface would undoubtedly make life easier for the end user. Indeed, modern building management systems (BMS) have evolved to offer this level of integration. However, fire detection has resisted full integration to date.

There are good practical reasons for this; not least the fact that fire protection is a life-critical function. The possibility that a fire signal could be compromised by a fault in a lighting circuit is not an acceptable risk. Historically, legislation and guidance governing fire system design and installation has been more prescriptive than for other BMS functions. It has therefore been simpler to keep fire detection separate – although this situation is changing as pan-European legislation seeks to unify and update individual country's regulations.

In real terms, there is a lot to be said for closer interaction between fire systems and other building functions like heating, ventilation and lighting. Indeed, it can bring some positive safety benefits. For example, the signal from a fire system could be used to tell the security system to release certain access doors in an emergency, or to page staff to enable them to respond appropriately when an alert has been raised. The aim would be to develop a means of facilitating greater integration between

ts in Fire Detection

fire detection and other BMS functions without introducing more levels of complexity – either for the installer or the end user.

Apollo has been addressing the issues of integration and has come up with an answer called OpenConnect Gateway. This discreet device can be incorporated into a fire control panel and enables the information from a fire system to be communicated to a BMS (and vice versa) using standard protocols Modbus, BACnet and LonWorks. In essence, this allows the fire signals to be fully integrated with other BMS signals, but allows the fire detection wiring and devices to remain physically separate.

Making Improvements

Of course, not all market trends demand the development of a brand new product or technology; sometimes making modifications and improvements to existing fire detection devices can ensure that they continue to offer optimum value and reliability to the installer and the end user.

One continuing challenge is the adequate protection of large open internal spaces, such as sports halls, warehouses, hangars, theatres and churches. The detection method of choice for wide areas is beam detection. Essentially, these devices work by projecting a beam of light across the space and measuring how much light is returned to the sensor. Smoke particles disrupt the beam, reducing the amount of light being received. It is therefore crucial that the emitter and the receiver are correctly aligned to avoid false readings. This is not always easy to achieve – particularly at height.

Apollo has recently introduced an auto-aligning beam detector with laser alignment that helps to overcome this problem. It enables the installer to use a visible laser to align the beam initially, rather than relying on sight alone. The technology also includes an automatic, motorised auto-alignment feature to ensure that the beam remains on target. This feature compensates for minor adjustments and counters any building movement over time.

Technology and Training

Sometimes, improving fire detection requires a combination of better technology and improved skills. For example, there is an ongoing need to provide adequate fire protection in circumstances where hard wiring is either not possible or not desirable. This covers quite a number of scenarios; from historic buildings with delicate interiors to remote or temporary structures where hard wiring is impractical.

Wireless fire detection is ideal for these types of situations. Instead of communicating using electrical impulses sent down cabling, these devices transmit radio signals back to a receiver. Apollo's own wireless range, XPander, is designed to be used in conjunction with a standard fire detection system, in order to protect areas that require wireless technology.

XPander has recently been improved to make the technology even more reliable. The range has been extended to include an optical smoke detector, a multi-sensor smoke detector, heat detector

types A1R and CS, a wireless base, a manual call point, a sounder and a sounder beacon and single and dual Input/output units.

Upgrading the technology is only part of the story. The ability of any fire detection device to function correctly is not reliant on good technology alone – it must be correctly specified and installed too. This is particularly important with wireless devices because they communicate in a very different way to hard wired fire detectors. Apollo therefore does not sell XPander to companies unless their installers have had suitable training. Apollo offers free training courses on XPander – and indeed all its other products – to improve reliability by ensuring that the technology is fully understood and applied correctly.

Improving Confidence

Having ensured that the right product is installed correctly and in the appropriate environment, it is important that end users have full confidence in their fire system throughout its lifetime. Apollo sees the issue of lifecycle costs as an area where knowledge within the fire industry is lacking, and has introduced a CPD-approved training course on this topic.

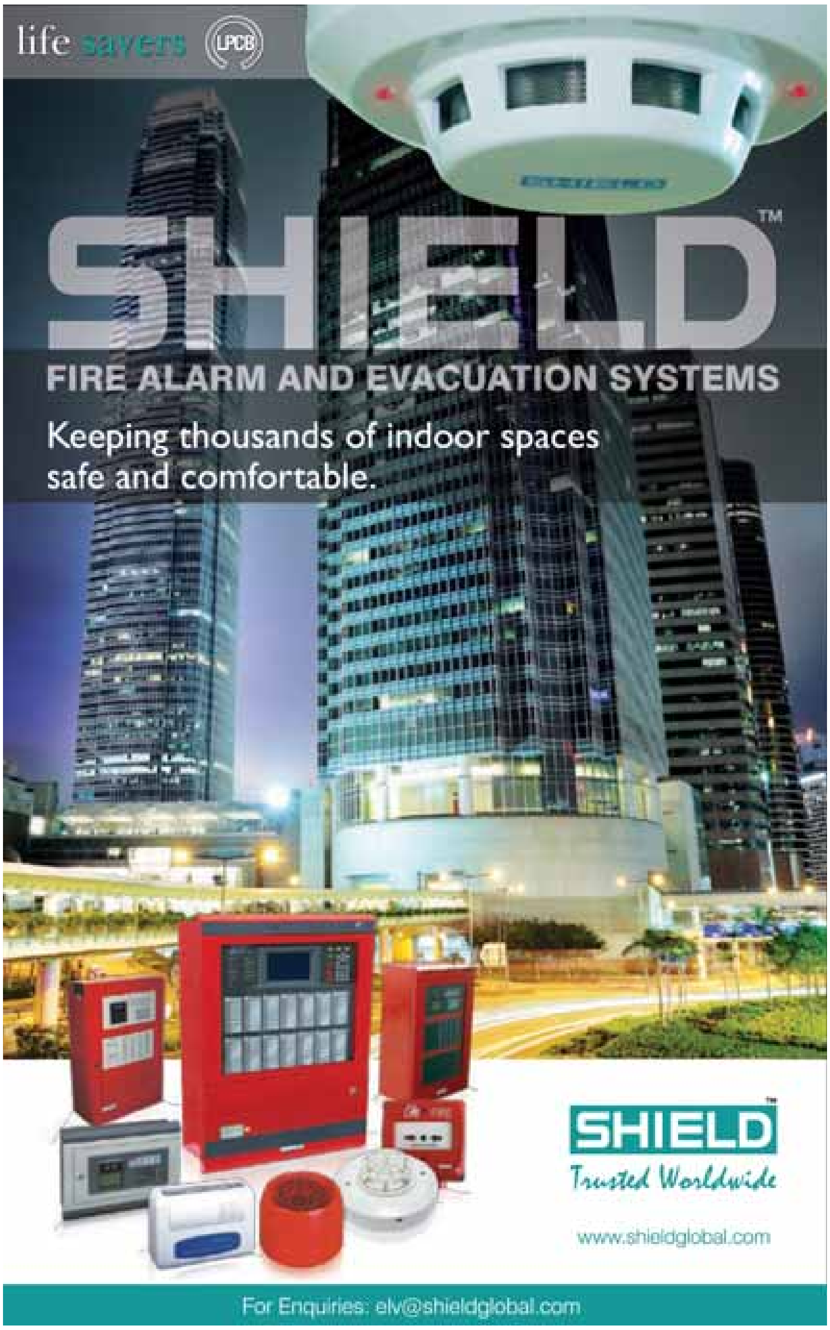
In addition, Apollo has taken the lead in introducing a product lifetime guarantee, which makes clear the life expectancy of Apollo products and is currently being rolled out worldwide.

At present there is no legal obligation to supply product lifetime information. BS5839, the industry code of practice, puts the onus on the manufacturer to define the working life of the product, along with requirements for servicing and maintenance. However, the amount of detail available can vary enormously from manufacturer to manufacturer.

We hope that other manufacturers will follow our lead in making this simple piece of information much more transparent in future. The benefits to the industry in terms of improving reputation and customer confidence are significant.

The product lifetime guarantee provides a warranty on Apollo products, which for detectors is ten years (CO detectors, five years). It protects against the unlikely event of a manufacturing defect and is applicable when products are used in dry, non-corrosive atmospheres (provided that they are regularly inspected, tested and cleaned in accordance with Apollo guidelines). All products that were manufactured from 1st December 2010 onwards are covered by the new guarantee.

We hope that other manufacturers will follow



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Looking Forward

So, fire detection technology is continuing to evolve to meet the needs of the market. However, there is a limit as to how far any single technology can be progressed. Fire detection has historically relied on a very small number of sensing technologies; mainly ionisation, optical and thermistor (heat). It is likely that a major step change in technology will be required in order for the industry to develop in new directions. In light of this, Apollo is already looking to the future.

One avenue that is being explored is the adoption of sensor technologies that are currently used successfully in a variety of other industries. An example is chemical or semiconductor sensors, which have proven very reliable in other applications and particularly in the detection of toxic and combustible gases. If this technology could be transferred reliably to fire detection it could lead to the use of just one sensor type to identify a whole range of fires – a move that could revolutionise the industry. Because they respond to traces of gas, semiconductor sensors could pick up the products of combustion far earlier than traditional smoke and heat sensors, allowing more precious time for evacuation or remedial action.

Adopting an open protocol policy offers freedom of choice regarding sourcing products and which components are used, both now and in the future.

With regard to general trends in fire detection, these continue to be driven by the desire to improve reliability and use technological improvements to deliver excellent customer service. In order to do so, specifiers and installers need to be able to respond quickly to new trends. We believe this is one of the reasons that open protocol fire systems will become the preferred choice in future.

Adopting an open protocol policy offers freedom of choice regarding sourcing products and which components are used, both now and in the future. This means that technology based on an open protocol is fully interchangeable, even if it is made by a different manufacturer. Forwards and backwards compatibility also means that an updated or new product can easily be added to an existing system at minimum cost and with minimum disruption.

Conclusion

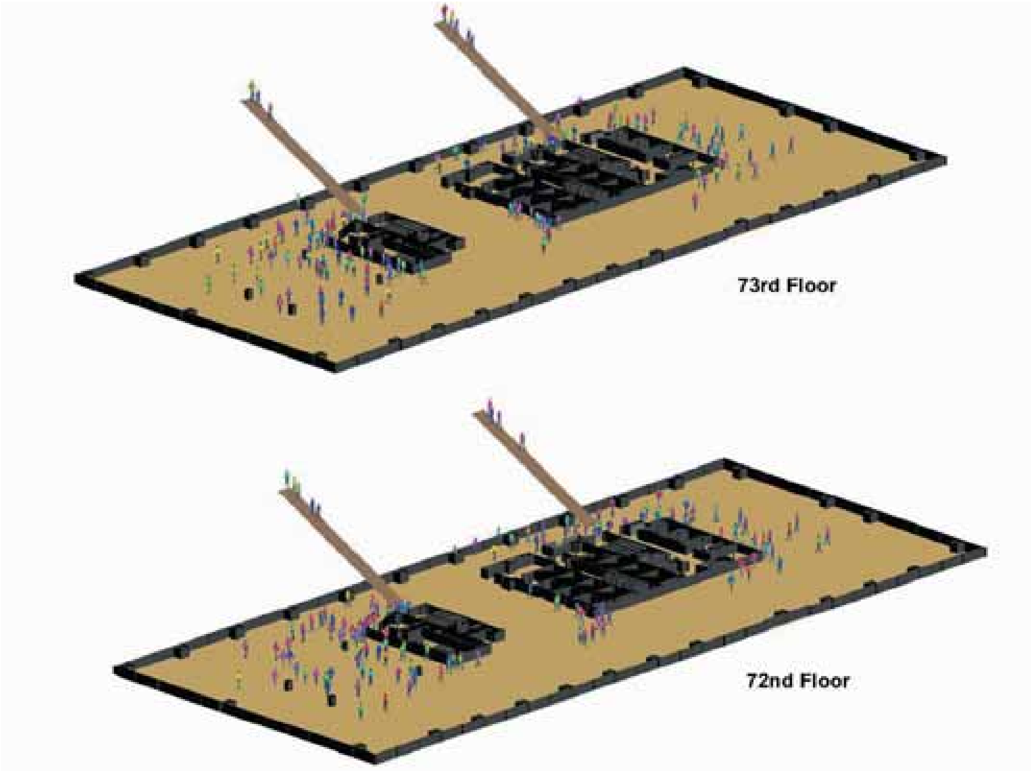
When dealing with a safety-critical technology such as fire detection, it is crucial that the technology is reliable and accurate. As buildings continue to evolve, it is not only the fire detection that must keep pace. As an industry, we must ensure that skills continue to match the technology available: the best fire detection product in the world cannot work to its best if it is incorrectly specified, installed or maintained. Apollo therefore puts great emphasis on training and will continue to add new courses to cover any skills gaps.

Customers' expectations continue to rise. The fire industry therefore needs to ensure that it delivers. Added to the development of new, appropriate technology and relevant skills, we need to demonstrate flexibility and responsiveness. This cannot be achieved in an atmosphere of secrecy or by limiting ourselves to one product or manufacturer for the lifetime of a fire system. Apollo firmly believes that improvements are best made by being open, sharing information and allowing trained professionals responsible for system design, installation and maintenance the freedom to choose. IFP

Richard Bramham is Marketing Director at Apollo Fire Detectors

For further information, go to www.apollo-fire.co.uk

High Rise Building Modelling



Steven D. Wolin

Code Consultants, Inc.

How do design professionals and regulatory authorities ensure that thousands of occupants located hundreds of meters above the ground are adequately protected from fires and other threatening events?

Compliance with applicable codes is a minimum, but often fire and egress modelling play a critical role in evaluating unique structures and verifying that appropriate protection is provided for occupants of tall buildings.

The following examples illustrate how fire and egress modelling can be used to assist in improving the level of safety for building occupants and firefighters in high-rise buildings. Increasingly, these types of analyses are being used to provide more detailed information about the performance of specific building configurations.

Improving Evacuation for Occupants High Above Ground

A large financial services firm constructing a new high-rise building is concerned about the safety of its employees from traditional fire scenarios as well as other threats, such as vehicle-carried explosive devices. Fire drills might provide information on occupant evacuation from the building, but only after the building is constructed and changes are difficult or impossible. Instead, the designers use computer egress modelling to evaluate the exit system design for the building prior to construction.

The design team uses a computer egress analysis to "build" the high-rise in 3-dimensions as a computer model. The egress system, including stairs, ramps, and doorways, is included in the model. Occupants are assigned to each room in the model and given characteristics such as walking speed and turning rate that are based on studies of people movement. This can include occupants with good mobility as well as occupants with mobility impairments. The distribution of occupants in the model can also account for people of various sizes.

Simulations are conducted to evaluate the building's complete egress system along with conditions where the egress system is compromised. For example, the analysis can investigate the impact of one or more stair towers being unusable due to structural damage from a blast or something as simple as smoke entry due to an open stair door. The model can also investigate the impact of firefighter entry via the stair towers on occupant exiting.

The results of the analysis show the movement of each occupant through the building during evacuation. The occupant movement data can be animated in a 3-dimensional computer model of the building to help illustrate the results for each scenario using computer generated videos. While

s – Fire and Egress

lacking some of the animation quality of recent animated films created in Hollywood, the egress modelling videos are not fantasy. The egress modelling videos are based on calculations designed to accurately depict the movement of occupants through the building.

The analysis results help the design team and the building's owner to develop strategies to improve evacuation from the building. For example:

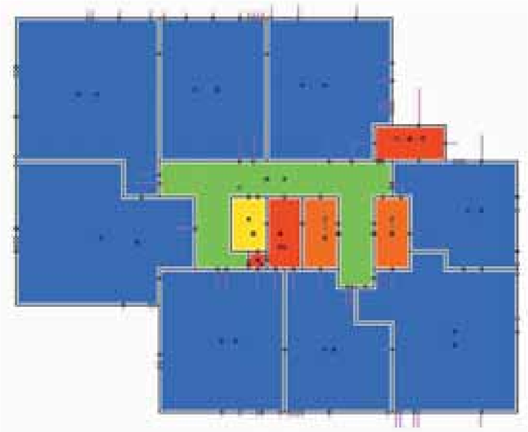
- Persons with mobility impairments are allowed to egress using protected elevators, which speeds their escape from the building and improves flow down the stairs for other occupants, significantly reducing their time to escape.
- Transfer floors allow multiple escape paths in the event that incidents on the street impact the discharge from one or more of the stair towers.
- The width and configuration of stairs is optimised to minimise both the egress time and the required width of stairs on a floor-by-floor basis.
- The impact of the loss of various egress components was analysed to provide redundancy in the design for the exit system.

Limiting Smoke Movement through a Tall Building

Realising that passive barriers are not perfect and that smoke is often the most threatening product of a fire, the owner of an iconic high-rise building requires a smoke control system to be developed to limit the movement of smoke through the building during a fire incident. In tall buildings, both wind and stack effect (the vertical movement of air through a building due to the temperature difference between the interior and outside) can influence the movement of smoke between floors. To account for each of these factors on the movement of smoke in the building, the design team uses a multi-zone airflow model.

Multi-zone airflow models calculate the pressures and flows across barriers between zones. Barriers include the floors and walls of a building. For example, stair enclosures, elevator hoistways, and other shafts can allow smoke to move vertically through a building during a fire condition. Mechanical smoke control has been used as a means to limit the vertical movement of smoke in a tall building by pressurising shafts or by providing a negative pressure on the fire floor compared to other floors of a building. The performance of mechanical smoke control systems can be impacted by wind effect and stack effect, and can be analysed using a multi-zone airflow model.

A multi-zone airflow model includes a schematic diagram of the building floors. The barriers between zones and the openings in those barriers are critical features of a multi-zone airflow model. The openings may include doorways, gaps around doors, air transfer openings used as part of the heating and air conditioning system, and construction gaps. Typical construction techniques result in small openings in barriers such as joints between walls and floor decks, gaps around electrical and



mechanical devices in walls, and other small openings that allow air movement across walls and floors.

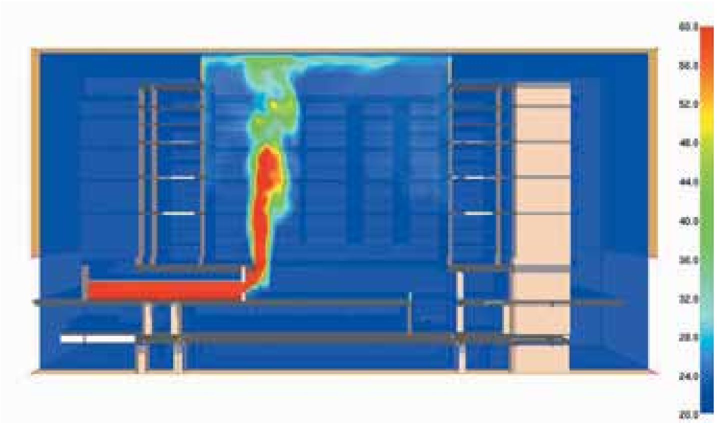
The size of these openings helps determine the amount of pressure produced by a specified amount of airflow from a smoke control system. Smaller openings result in a greater pressure difference across a barrier than larger openings for the same amount of air flow. For example, air supplied to an elevator hoistway that produces a minimal pressure difference across the hoistway doors because of large gaps around the doors, might produce a very high pressure difference when the same air travels from the elevator hoistway into a tightly constructed corridor with gasketed doors. Accurately modelling the openings in the building construction or analysing a range of possible openings allows the multi-zone airflow modelling to assess the interaction of the building construction with the smoke control system.

Mechanical systems such as normal heating and air conditioning systems, exhaust systems such as toilet and kitchen exhaust, and smoke control systems can be included in the model. In addition, environmental conditions such as wind, exterior temperature, and interior temperature can also be included in the computer calculations.

The results of the multi-zone airflow model include pressure differences and air flow rates between zones for various scenarios of wind, stack effect, fire location, and mechanical system configuration. The results are used to evaluate if a smoke control system design will maintain pressures across barriers sufficient to resist the movement of smoke during a fire condition and to verify that high pressures are not produced that could be detrimental to the operation of building systems.

The results of the multi-zone airflow model identified the following significant features of the smoke control system design:

- High-performance curtain wall systems and tightly sealed corridors limited the impact of wind on smoke movement in the building, but produced a significant pressure within the building during the operation of the smoke control system. In essence, air supplied to the building to create a positive pressure for smoke control must have a path to reach the atmosphere.



- Strategically located relief venting allowed pressure differences to be maintained across shaft walls without negatively impacting door opening forces or the operation other building systems.
- The size of fans needed to power the smoke control system was minimised based on the results of the simulations.
- Stack effect was found to significantly influence the pressure differences within the building.

The Atrium: Protecting Occupants from Fires on Lower Floors

Atriums have become relatively common design elements in modern buildings. They have many perceived benefits in terms of creating an open feeling in a building and allowing natural light to reach multiple floors. But, from a fire protection and life safety perspective, atriums are holes in floors that provide a conduit for smoke movement to multiple levels of a building. To protect occupants from smoke travelling through atrium floor openings, a mechanical smoke control system is often provided.

The designers of a high-rise hotel plan to include an atrium that connects circulation spaces on each of the hotel floors. Algebraic calculations were used to estimate the required exhaust rate to protect occupants on the upper levels from smoke. However, the calculations required substantial exhaust rates and make-up air openings, did not account for the dilution of smoke as it rose through the atrium, and had not been validated for use in such a tall space. Due to the limitations of the algebraic calculations, the design team proposed the use of a Computational Fluid Dynamics (CFD) fire model to evaluate smoke movement in the atrium and the performance of potential smoke control system designs.

CFD models have been used for many years to calculate air movement for the design of airplanes and motor vehicles and more recently for the evaluation of ventilation strategies within buildings. CFD models solve fundamental equations of fluid motion by applying them to small volumes. Thus, a CFD model consists of a 3-dimensional computer model of the space being analysed that is divided into thousands or millions of volumes to allow the fluid dynamics equations to be solved and then the solutions for each volume are combined to characterise the movement of air, or smoke, throughout the space.

Modern CFD models have the capability to analyse smoke movement as well as heat transfer and the performance of fire protection features. A CFD analysis calculates the conditions in the atrium in terms of tenability criteria such as temperature, carbon monoxide concentration, and visible distance, instead of relying on a theoretical smoke layer used by algebraic calculations and simple zone type fire models.

CFD models provide relatively accurate calculations of smoke movement in an atrium, but require significant computer resources that until recently were only applied in specialised applications. Over the past ten to 15 years computer power has increased to the point where CFD analysis can be applied within the budget and schedule of large-scale construction projects.

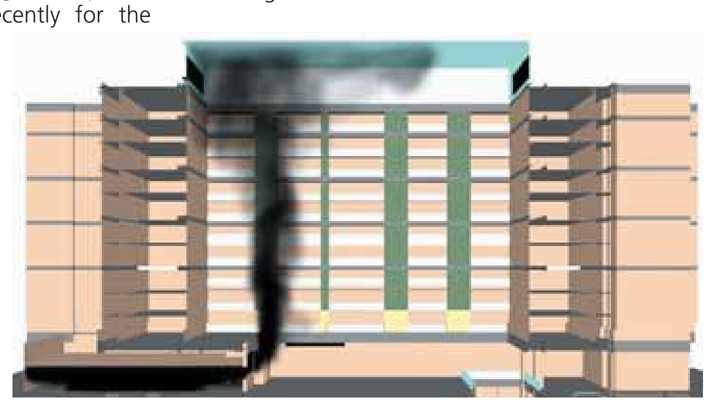
A CFD model was used to analyse design fire conditions in several locations in the hotel atrium for the purpose of selecting exhaust and supply rates and locations for the smoke control system. In addition, the CFD model was used to optimise the design of the smoke detection system in the atrium and calculate the activation time of the sprinkler system.

The results of the CFD analysis provided the following benefits to the project:

- Ensured that the very tall atrium space was protected by the proposed smoke control system by calculating the exposure to occupants during various design fire conditions.
- Significantly reduced the required exhaust and make-up air rates for the smoke control system compared with the results of the algebraic calculations.
- Optimised the entry of make-up air into the atrium to limit the influence of the make-up air on the design fire and the amount of smoke produced.
- Designed a smoke detection system that reduced the number of smoke detection devices while improving the response time.

Summary

The examples above are not futuristic academic research, but the application of practical engineering tools that have been used for more than ten years in the design of buildings. Together they help designers, owners, and regulators improve the level of safety for occupants of tall buildings. IFP



Steven D. Wolin, P.E. is Principal at Code Consultants Inc.

For further information, go to www.codeconsultants.com

Insulated Panel S Fire Protection

The only reliable way of assessing panel system combustibility is to base a judgment on testing the entire system. Large scale insurer approved tests and standards, such as LPS 1181: PART 1: ISSUE 1.1 2005 Part One (Requirements and Tests for Built-up Cladding and Sandwich Panel Systems for Use as the External Envelope of Buildings) are ideal in this respect.

Mark Harris

Kingspan Insulatead Panels

The rapid growth in popularity of insulated panel systems for roofing and cladding applications, due to their undoubted benefits in terms of energy efficiency and sustainable building, has lead to their widespread use in all kinds of non-domestic construction.

The degree to which insulated panel systems (sometimes also referred to as sandwich or composite panels) perform in a fire depends on a number of factors, but both testing and real case studies have provided evidence that PIR cored insulated panel systems can make a real contribution to the passive fire protection characteristics of a building envelope.

Not all panel systems have a PIR core and, in the past, there has been a tendency to place them all in the same category, despite very different levels of fire performance. For example, a number of serious fires in the food and drinks industry in the UK a few years ago created concern about all types of insulated panels, yet these fires mostly involved polystyrene cored panel systems used as internal structures. A first key issue therefore, is to differentiate

between panel core types and applications – particularly the distinction between structurally supported external envelope panels and free standing systems used internally.

It is also important to look at the building construction in context. Probably the most significant contributing factor in risk potential is the scale and fire load of the building contents. In terms of overall risk it is vital to consider issues such as what the building is used for, how many people are likely to occupy it, and what the chances are of an arson attack. In statistical terms the risk is far greater in a school than in a distribution warehouse.

Importance of Testing

Even in a low risk situation it is preferable to minimise that risk still further by understanding the properties of the materials used in the construction of the building and specifying appropriately. The only reliable way of predicting how a particular panel system will perform in a fire is to base a judgement on testing the entire system in a situation as near to how it would actually be installed as possible. Large scale tests and standards such as LPS 1181 and FM 4880 are ideal in this respect.

LPCB

The LPCB (Loss Prevention Certification Board) test, sometimes referred to as the 'garage test', comprises a 10-metre long, 4.5-metre wide, and

ystems & Passive

Case Study: RA Wood Adhesive Tapes

The fire occurred at the premises of RA Wood Adhesive Tapes in Cannock in 2009, and an examination of the building by independent fire engineering consultants, Tenos, was commissioned by Kingspan Ltd in order to assess the behaviour of the building envelope products involved in the fire.

The steel framed building was shared with a joinery company; the two areas being separated by a compartment party block wall with a sand cement fire stop to the underside of the insulated panel roof cladding. The roof and upper parts of the external walls comprised PIR cored insulated panels approved to LPS 1181 Part 1 Grade EXT-B. Contrary to the recommendation by Approved Document B (2000 edition) of the UK Building Regulations, there was no 300 mm band of limited combustibility material over the party wall.

The fire at RA Wood Adhesive Tapes completely destroyed the roof structure, while the roof over the adjoining joinery company tenancy is still in place

Closer inspection reveals the charred core of the roof cladding. The \PIR core remained in place to the centre of the block-work leaf on the RA Wood Adhesive Tapes side of the party wall

The fire is believed to have initiated at a high level light fitting. Although the building was occupied at the time, all personnel were safely evacuated. The fire load density within the building was intense, probably due to the high quantity of combustible raw materials involved, and led to the total collapse of the supporting steelwork in the part of the building occupied by RA Wood Adhesive Tapes and the destruction of an abutting covered storage building.

A 30 minute fire door and fire rated glazed screen between the office and the production area were unable to maintain their integrity. The severity of the fire was such that the Fire Service decided to allow it to burn itself out until the following morning when it had reduced sufficiently to allow it to be extinguished; there were reports of 60 firefighters in attendance.

There was evidence that the party wall separating the two tenancies was subjected to at least the equivalent of a 60 minute fire resistance test. The bottom cladding sheet had fallen away at the head of the party wall, and the exposed PIR core was charred, but the fire compartmentation was not compromised. There was no spread of the fire over the wall, and the roof remained sufficiently intact for the joinery company to resume business shortly after the fire had been extinguished. The lack of a band of material of limited combustibility proved not to be an issue, with the char on the PIR core performing forming an effective fire stop between the steel skins of the cladding.

This case study provides a clear example of the excellent reaction to fire performance of LPCB-approved PIR panel systems under fire attack from the inside of a building, and supports the relevance of LPCB certification. But, another key question is how well will an LPCB approved panel system stand up to an external fire attack?

3-metre high enclosure clad in the materials under test. The enclosure is open at the front and has a ventilation window at the side. A wooden crib, which generates a 1MW fire load, is ignited in the corner and the fire development is monitored. Although there are a number of pass or fail criteria, the key parameter is that there should be no fire propagation beyond a 1.5-metre zone around the crib.

In recognition of the different requirements for internal and external performance, the original Loss Prevention Standard from LPCB, LPS 1181: Issue 3: 1999, was replaced with LPS 1181: 2003 (*Requirements and Tests for LPCB Approval of Wall and Ceiling Lining Products and Composite Cladding Products*: Part 1: *External Envelopes* and Part 2: *Internal Constructions)*.

Under Part 1, grades of performance are described as EXT-A and EXT-B. For the vast majority of external cladding applications, EXT-B is suitable; EXT-A is required only for buildings with special risks, as defined by an appropriate risk assessment or boundary wall conditions.

FM Global

FM Global uses FM 4880 (2005) (*Approval Standard for Class 1 Fire Rating of Insulated Wall or Wall and Roof / Ceiling Panels, Interior Finish Materials or Coatings, and Exterior Wall Systems)*. There are various levels of performance, with the key level being Class 1 Approval with no height restriction. Achievement of this performance level is dependent on performance in a number of tests that can include:

- Heat of Combustion – ASTM D3286-91a.
- Ignition Residue – ASTM D482-95.

Case Study: Spider Transport

An arson attack at Spider Transport, a warehouse and distribution business in the Republic of Ireland was captured on CCTV and subsequently investigated in depth by independent fire engineering consultants, Tenos. The investigating team was able to pull together a detailed record of how well the building performed, providing a useful example of how this type of construction behaves under what were extreme external fire conditions.

The building comprised a steel frame with brickwork lower walls and LPS 1181 Part 1 Grade EXT-B insulated panels with a PIR core as the upper wall cladding.

On the night of the fire in question at Spider Transport, a truck had been parked across the two main "up and over" doors of the building to prevent unauthorised access while the building was unoccupied. The arsonists used the truck's cab to start a fire, which quickly spread throughout the vehicle. The intensity of the fire and the proximity of the truck to the building meant that the insulated panels were soon exposed to what is referred to in the Tenos report as "prolonged flame impingement".

Despite the ferocity of the fire, the inside of the premises was unaffected and business resumed as normal the next day, highlighting the efficacy of LPCB approved panels in helping to limit fire spread and minimise damage and insurance costs

The fire burned uncontrollably for 25 minutes – the isolated location meant that the alarm was not raised until 15 minutes after the fire started. There was also an explosion and a fireball during this time. This meant that the panels close to the fire were subjected to sustained fire conditions. Despite this the investigating team found that the core material was essentially unaffected.

- Flammability Characterisation – 50kW FM Approvals Flammability Apparatus.
- Surface Burning Characteristics – ASTM E84.
- Room fire test – UBC 26-3.
- FM 15-metre room corner test.

The 15-metre room corner test is very severe. Two walls 15.24 metres high with a small ceiling are lined with panels, and a large fire source (345kg of dry timber) is positioned in the corner. To satisfy the requirements for approval without any height restriction, there has to be no flame spread or fire propagation to the extremities of the panel construction.

The varying levels and grades of performance defined by these tests allow the specific panel system performance to be matched to the specific risk. The real issue is not directly related to the combustibility of the panel system or core – all have combustible elements. The real issue is related to how a specific system will perform in an actual fire scenario, and whether it acts like a non-combustible building element by not contributing to fire propagation.

Facts about Panels

Research has shown that "Insulated panels fixed to the building structure, in particular the roofs and external walls of buildings, remain secure without collapse even when the fire changes from a developing to developed stage"

Obviously, the possibility of panel system collapse and internal flashover is a major concern for fire fighters. Experience has shown that buildings clad in structurally supported (mechanically-fixed) external panels do not present a specific hazard, as the panels will not collapse until the structural steelwork frame collapses. However, free standing internal panel systems are a different matter, and so if compartmentation is to be used as a means of reducing fire risk, it needs to be done using panel systems that are both suitable and securely fixed.

The risk of fire spread over compartment or party walls is also one which is worthy of consideration. A recent case study provides an excellent example of how LPCB-certified PIR cored insulated panels can help to prevent the spread of fire over party walls.

Report Findings

Key considerations during the investigation were whether the panels had contributed in any way to the spread of the fire and whether they had in fact helped to prevent fire entering the building. Significantly, according to the report, there were no signs of any spread of heat via the cores of the insulated panels to any point within the building, and no signs of spread within the cores of the panels themselves.

Even though the standard construction details for the junction between the cladding and the wall and door frame had been used, which left a small amount of PIR core directly exposed to the flames, the report concluded that not only were there were no signs of any spread of heat but also the panels had not contributed to the damage caused by the fire in any way. Also, there was no delamination of the metal panel lining and the insulation core stayed in place – important factors in maintaining system integrity.

Despite the ferocity of the fire, the building envelope protected the interior to such an extent that the inside of the premises was unaffected and business resumed as normal the next day. The value of stock in the warehouse area was in excess of ¤10,000 and the offices above housed computers and files that were essential to the smooth running of the business. All of these remained intact and in full working order after the fire. This was due in no small part to the LPCB -approved panels ensuring that fire did not spread, whereas if it had reached the inside of the building it is likely that there would have been considerable write-off of stock and business disruption. IFP

Mark Harris is Divisional Building Technology Director at Kingspan Insulated Panels

For further information, go to www.kingspanpanels.com

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DX1040	Anionic	●	●	–	–
DX1080	Nonionic	●	●	●	●
DX1090	Nonionic	●	●	●	●
DX1025*	Anionic	●	●	–	–
DX1026*	Anionic	●	●	●	●
Foam Stabilizers					
DX5022	Anionic	–	●	–	●
DX5065**	Anionic	–	●	–	–
DX5066**	Anionic	–	●	–	●

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Assessing The Risk

Harry Paviour

International Institute of Risk and Safety Management

There are many reasons we carry out a risk assessment to ascertain the risk of a particular hazard, but first, we need to understand the aims and the objectives of what a risk assessment is.

What is a 'Risk Assessment'?

"A risk assessment is an organised and methodical look at an unplanned situation which could cause harm to people and significantly disrupt or destroy property including, all those people who are likely to be in and around your business".

The aims of any risk assessment are threefold:

1 To identify the hazards.

2 To reduce the risk of those hazards causing harm down to as low as reasonably practicable.

3 To decide what physical precautions and management arrangements are necessary to ensure that the safety of all people and reduce subsequent damage to a business should an un-planned event occur?

The application of risk assessment is used today in all aspects of our lives ranging from health and safety, environmental issues, emergency planning, natural and man-made disasters and other major emergency incidents.

The risk assessment is about looking at the hazards and risks, but what is:

- A hazard: anything that has the potential to cause harm.
- A risk is: the chances of that hazard occurring.

Trying to assess the risk of a natural disaster occurring is difficult, unless certain specific natural disasters are a regular occurrence, for example earthquakes, forest fires, and heavy rain falls causing large scale flooding during certain months of the year.

For a person to be recognised and considered 'competent' in carrying out a risk assessment, they need to be able to demonstrate their competence by having undertaken enough specialist training in that subject, combined with appropriate experience or knowledge and such other qualities as to be able to implement measures properly.

So, let us consider one example of a man-made hazard; assessing the risk of fire particularly in the workplace.

Fire Risk Assessment

Books and articles in journals have been written on managing the risk of fire, many of them concentrate on the European approach to fire risk assessments.

Any manager's approach to fire safety looks at the risk assessment tool to eliminate and reduce the risk of a fire occurring in a premise. However; the risk assessment is only one of the procedures to managing the risk of fire. The fire risk assessment process plays an important part in identifying the risks of fire for life safety and property protection and we need briefly examine this process.

Within the UK and the EU countries, carrying out a fire risk assessment is now the statutory duty to determine the risk to those people from fire and the hazards of fire itself. It is well recognised that this approach to managing the risk of fire is not necessarily specific to the European Community, other countries are now following suite.

Many major insurance companies now use the risk assessment approach to assessing the financial risk of a fire in a building, from which they are able to work out the likelihood and extent of a fire and what it is likely to cost the insurance company in the event of a claim for fire loss and damages.

In 2006 the UK Government produced a serious of guidance documents so occupiers could carry out their own fire risk assessments using the guides as what would be a reasonable approach to reducing the risk of fire and for the protection of people and property. These guidance documents do not set out to insist on mandatory standards, but they do suggest that a consistent five-step approach should be adopted.

Step 1. Identifying the significant fire hazards:

- All the Sources of ignition.
- All the sources of fuel and.
- The sources of Oxygen.

Step 2. Indentifying those people who may at risk from a fire:

- All people in and around the premises.
- Those people especially at risk from a fire.

Step 3. Evaluate, remove, reduce and protect from the risk of fire:

- Evaluate the risk of a fire occurring in the first place.
- Evaluate the risk to all people in the event of a fire.
- Remove or reduce the identified fire hazards.
- Remove or reduce the fire risks to people, including:
  - o Evaluate the Fire Detection and the Fire Warning arrangements.
  - o Evaluate the provisions for Fighting Fire.
  - o Evaluate the adequacy of all the Fire Escape Routes inside and external in the event of a fire.
  - o Evaluate the Adequacy of the Artificial and Emergency Lighting.
  - o Evaluate the Adequacy of all the Fire related Signs & Notices.
  - o Evaluate all the maintenance arrangement to ensure that those installed and provided fire provisions are reliable when needed.

Step 4. To record your findings, plan, inform, instruct and train:

- Record the 'significant findings' and prepare an action plan.
- Prepare an emergency plan (i.e. fire evacuation procedures).
- Inform and instruct relevant people; co-operate and co-ordinate with other people.
- Provide appropriate training.

Step 5. To review the process:

- Keep your fire risk assessments under review.
- Revise where necessary.

Your risk assessment has to be thorough, searching and honest in recognising your findings. This approach is the first part in 'effectively managing the risk of fire'.

As an additional driving force to achieving a satisfactory overall fire risk management, there are other considerations you should address. We should build-in time in identifying why the following four main headings should be included into managing the risk of fire at your premises.

Business Continuity, Emergency Plans, Critical Incident Planning

While it is impossible in today's world to predict every kind of incident or emergency that will threaten the lives of people and or the commercial operation for a company. It is reasonably easy to draw up a basic workable plan that can be quickly implemented, to be flexible in its design and to cover a wide range of possible emergencies. As the saying goes if you fail to plan, you plan to fail.

The salient points of your planning are that it should provide a framework for your organisation to fall back on following a specific emergency. The starting point must be the development of flexible management arrangements for the handling of any crisis, regardless of their origin or cause.

It follows that your crisis management arrangements should be aligned with the normal day to day management, not least because routine activities have to be maintained during the entire period the emergency is being handled. This integration of routine emergency procedures should embrace a number of concepts, all of which need to be amalgamated into your organisation if they are to be truly effective.

Having a major emergency in your premises will cost money in every sense of the word.

Amenity Value

For those premises that provide social and recreational facilities for the public's use at local and national level, the assessor must now take into account the amenity value that these premises have. This must be included into your management of the risk of fire within these premises.

Environmental Pollution

This is a particular issue that is often overlooked or not recognised as a subject the premises owner or occupier would need to consider as part of the fire risk assessment. Damage to the local environment resulting from a fire must also be included in your fire risk management plans.

Environmental Pollution ranges from fire water run-off that will contaminate land and water supplies by finding its way into water sources, and airborne pollution resulting from the contents of smoke and fumes rising from the fire, some of which will contain harmful particles.

We must recognise that smoke and the products of combustion will directly affect all those nearby properties located down wind from the fire. This is why, when you carry out a fire risk assessment, you must consider what effects fire and smoke can have on your neighbour's property.

Fire water run-off and where it goes to, is a serious concern to not only the Government's Environmental Agencies but to the Fire Services. Fire Services can in some countries be faced with prosecution for failing to make the necessary arrangements to restrict, prevent or contain polluted water contaminating water supplies and land.

Heritage Status of Premises

Every country in the world has a heritage background comprising buildings, statues and monuments, many dating back hundreds if not thousands of years. Your fire risk management system therefore must be even more robust as these buildings and their original contents cannot be replaced following a fire.

We must accept that following a fire risk assessment, it may not always be possible to install structural fire precautions to protect people and or reduce the fire spread. Therefore, compromises by providing electronic fire protection may need to be considered as an alternative.

The application of fire engineering solutions may be the only alternative in fire protection. However, even then, expecting to install fire suppression and/or fire detection systems in some internal areas may be refused on the grounds of being too detrimental to the visual aesthetics of those internal areas of the building or specific rooms. With these restrictions, other fire risk management systems may have to be brought in for those areas.

Conclusion

In summing up, fire risk assessment for any premises must be commenced at the primary stages of planning, development and continue through to the final occupation. It should then apply for the rest of the building's life.

The practice of carrying out a fire risk assessment is probably the most positive way to identify fire hazards. Having identified them, you now have a direction by which you can prioritise and commence to address and manage deficiencies. We must not though forget the other issues of preparing business continuity and emergency plans; the effects on the local environment from a serious fire, the amenity value these premises may have for our communities.

A risk assessment process is not 'rocket science' but it is about adopting an attitude of mind, a safety culture and applying common-sense to address identified deficiencies. By not thinking through and not addressing the need to be pro-active in your approach to fire safety management, it may cost you dearly in life and property. Remember all that burns, never returns. IFP

Harry Paviour is a Fellow of the International Institute of Risk and Safety Management

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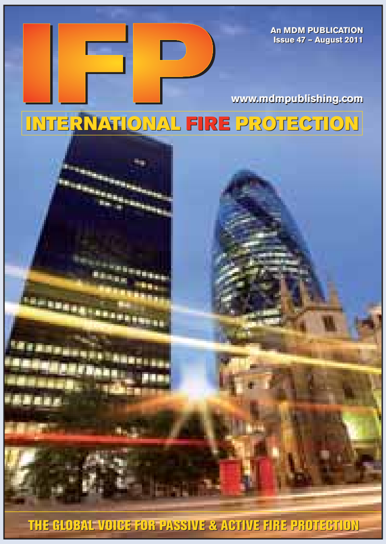

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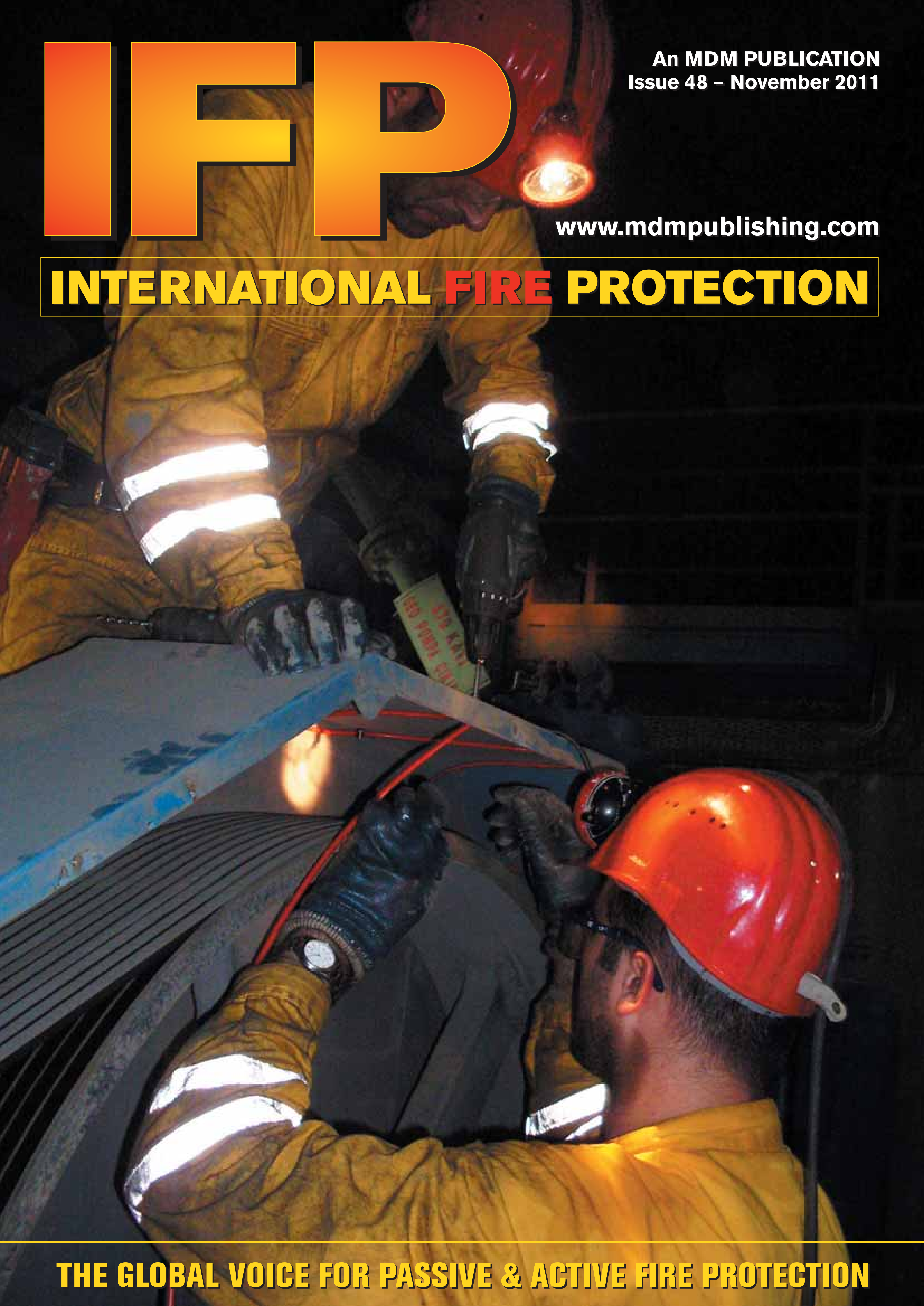

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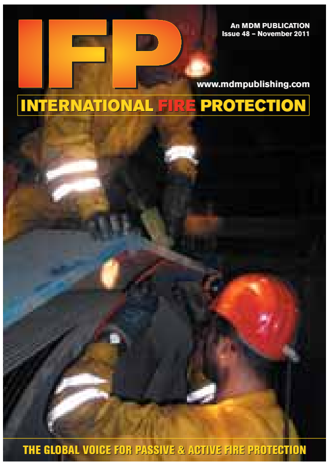

Firetrace International Automatic Fire Suppression System, Cayeli Copper Mine, Turkey

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Graham Collins

Editorial Contributors
Dennis Lundstedt, David Gentle, Bob Chapman, Bob Choppen
Lee Coates, Scott Starr, Larry Cody, Wilf Butcher, Graham Collins

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Tel: +44 (0) 1935 426 428
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Graham Collins

Email: graham.collins@
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Who's Pocket?

With more and more pieces of legislation finding their way onto the statute books that place the onus for fire safety onto building occupiers we may have all lost sight of another reality. News coverage of building occupiers having to dig deep into their corporate pockets to pay fines for failing to meet their obligations does not mean that fire detection and alarm system manufacturers and installers can dodge the penalty bullet. Indeed, the increase in the number of businesses being taken to task may well see more of them seeking to pass the burden down the line.

It is the old law of the jungle. Somebody gets fined or sued and immediately looks for somebody else to blame and foot the bill. And we can be talking about big bucks.

Take the recent case in the UK where a confectionery company sued the system manufacturer when a fire raged through its premises and left it a smouldering ruin. While the company did not recover the £110 million it was seeking, the system manufacturer in question had to fork out £25 million in compensation. A failure to assess correctly the type of fire that might occur, the installation of an inappropriate suppression system and the siting of sensors that resulted in a slow response to the fire, along with conflicting terms of business were highlighted by the judge in his summation.

In the current economic climate, £25 million takes a lot of bottom-line earning and does little to promote the particular company's reputation. It also throws into sharp focus the need for system design and installation companies to ensure that the people they are employing in such critical roles are thoroughly trained, highly experienced and meticulously diligent. Of course, it is not a fair world and the total right-off of the building in question was also attributable to inadequate or ill-advised emergency procedures in the factory that appear to have aided the spreading of the fire.

Not that the system designer was the only one to come in for sharp words from the judge. He was somewhat scathing about the "expert" witnesses called by both parties. He used terms like "floundering", "unfocused" and "often unrelated to the issue", and summed up by stating that he: "…found this approach to expert evidence unsatisfactory and unhelpful…". Not exactly the kind of remarks that we ought to be hearing about the industry's professionals opinion formers.

In the current economic climate, £25 million takes a lot of bottom-line earning and does little to promote the particular company's reputation.

Of course, I feel certain that this case and the judge's remarks are not representative of the industry globally. But neither should we too hastily dismiss them as a "one-off". Knowledge and experience are things that we should all strive to increase and share, and we learn by listening, watching and reading. That is why International Fire Protection continues to cover as broad a spectrum as possible of topics on fire protection, to disseminate the latest thinking to the widest possible audience.

I have no doubt that there are times when readers pass over an article believing that they already know the particular topic inside-out. Perhaps they are right. But perhaps they are wrong, because the article may inspire a train of thought that leads to improving a product, enhancing a service, or simply adds to the reader's storehouse of knowledge. One thing is sure; it is certainly better than writing a cheque for £25 million. IFP

New Infrared Beam Detector

A new end-to-end infrared optical beam smoke detector has been launched by FIRE FIGHTING ENTERPRISES. The new Fireray 3000 is claimed to be a particularly cost effective solution for the protection of large, open-area spaces, and in situations where ceiling-mounting is difficult or inappropriate, requiring small numbers of units to cover very large areas.

It has been designed for applications where line-of-sight for the IR beam path is narrow, or where the building structure uses particularly reflective surfaces, which may cause complications for reflective beam system installation. Each element of the package has also been designed to be both discreet and aesthetically pleasing, helping them to fit well into every environment from modern architectural buildings to ornately-decorated heritage sites.

Installation is quick and easy, and can be completed by a single operator. A visible targeting laser housed in the receiver head aids initial placement and setup, showing clearly the beam path and the necessary positioning for the units. During commissioning the LEDs on the heads also light up to help fine-tune the alignment path, showing the installer in which direction adjustment is needed. Both of the detector heads have integrated alignment thumbwheels for simple, intuitive and repeatable targeting adjustment, with up to ten degrees of motion available on both horizontal and vertical axes.

For more information, go to www.ffeuk.com

Electric Bus Fire Protection

Poland's Solaris Bus & Coach company's latest innovation for sustainable transport – the new first-of-its-kind Solaris Urbino electric bus – is being protected by FIRETRACE INTERNATIONAL's Firetrace automatic fire detection and suppression system. This latest Polish order brings the total number of Polish buses protected by Firetrace systems to more than 1500.

The Solaris Urbino is powered by a 120 kW four-pole asynchronous traction motor and the energy is stored in two 700 kg liquid-cooled, lithium-ion batteries that have a rated voltage of 600 V and the capacity to store 120 kWh. The traction motor compartment is protected by a 5kg ABC dry powder Firetrace system, while each of the two batteries is protected by a 5kg Firetrace system using 3M Novec 1230 Fire Protection Fluid.

As an additional safety measure on the Solaris Urbino, a tee is included in the installation, which takes a section of tubing to a pressure gauge mounted on the driver's dash board, providing a clear visual indication of the system's status and enabling system discharge to be monitored from the cab.

For more information, go to www.firetrace.com

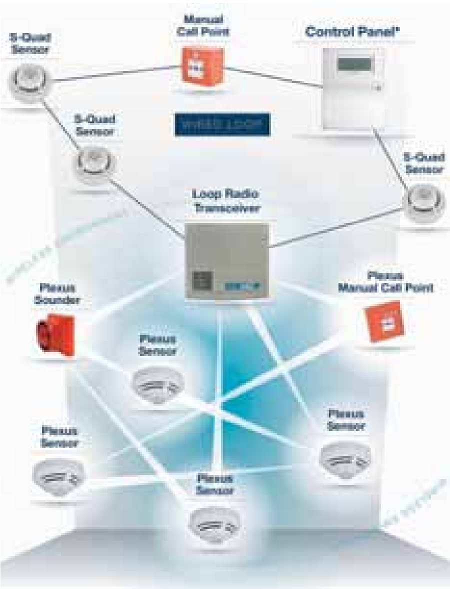
Cable Goes for Gold in Velodrome

Over 50,000 metres of PRYSMIAN FP200 Gold and FP600S cable have been installed in the Sir Chris Hoy Velodrome, part of the National Indoor Sports Arena and Velodrome in Glasgow, Scotland. The Velodrome will contain a 250-metre high-banked wooden cycle track and an infield area for the cycling events at the 2014 Commonwealth Games. The entire complex will be one of the largest indoor sports facilities of its kind in Europe when completed in March 2012.

FP200 Gold is approved to BSEN50200 + Annex E, for the "standard" requirements of BS 5839-1 for fire alarm systems and BS 5839-8 for voice alarm systems, and PH60 requirement of BS 5266-1 for emergency lighting. Prysmian's FP600S cable is BASEC (British Approvals Service for Cables) approved and complies with the highest level F120 of the cable standard BS 7846:2009 for armoured, fire resistant 600/1000V cables, having low emission of smoke and corrosive gas when affected by fire.

For more information, go to www.prysmian.com

Hybrid Wireless System Unveiled



GENT BY HONEYWELL has launched its first ever wireless fire detection system. Called Plexus, the system is claimed to incorporate a unique technology that offers: ". . . the ultimate level of integration and user confidence".

Plexus offers the flexibility of both wired and wireless devices on site. The designer can specify wireless devices when building constraints prohibit the use of cables, or when an installation disruption needs to be minimised. In areas of buildings where cables can be run without detriment to the building fabric, wired devices can still be incorporated.

The radio technology employed by Plexus, developed initially for the petrochemical industry, offers a reliable and resilient method of wireless communication. While, Gent says, other radio fire systems need every detector to relay signals to a single transmitter, the Gent system ensures that every device on the radio loop can relay its own signal, as well as the signals from other devices nearby, to maintain the connection.

The new hybrid system works using an integrated wireless approach, incorporating up to ten radio loop transceivers, each acting as a gateway between the wired and the wireless system. The wireless devices use the same addressing and labelling structure as the wired loop, thus allowing seamless integration. Wireless parameters such as battery life, device type and device status are reported back to the main panel to enable the full system to be managed from a single point.

The system supports call points, sounders, strobes and a comprehensive range of sensors that incorporate Gent's renowned multifunctional S-Quad technology.

For more information, go to www.honeywell.com

Power to the People

A new fire alarm system at the Little Barford Power Station in Cambridgeshire, England is to be designed and installed by CHUBB FIRE & SECURITY.

The Little Barford Power Station is a combined cycle gas turbine power station that provides power to hundreds of thousands of homes and businesses in the counties of Cambridgeshire and Bedfordshire. It was built in 1994, commissioned in 1996, and has a generating capacity of 680MW – enough power to meet the electricity demands of over half a million people.

The new Chubb solution includes a network of fire control panels and multi-spectrum detectors to replace existing infrared flame sensors. The new detectors use advanced signal processing algorithms to provide continuous protection over a large area, and are claimed to have the highest level of false alarm immunity. The wiring of the existing system will be retained to help minimise the cost and disruption of installation.

For more information, go to www.chubb.co.uk

New Carbon Monoxide Sensor

CITY TECHNOLOGY has introduced the 4CM, a new carbon monoxide (CO) sensor said to be designed for use in the world's most challenging environments and meet the most stringent toxic gas and mining standards.

The 4CM is claimed to outperform other sensors on the market by responding 12% faster to CO hazards and recovering in over half the time of the industry average. It offers electrical and mechanical backwards-compatibility with previous generations of City CO sensors.

It has a typical T90 time of seven seconds and a recovery time to an indicated level of less than 2ppm in less than 100 seconds. During 50-day exposures in 50°C and 11% relative humidity, and 50°C at 95% relative humidity, the 4CM operated to specification. The sensor meets the EN45544 requirements for uncertainty, typically achieving 1ppm for zero concentrations and less than 1% variation at 250, 750 and 1000ppm.

Carbon monoxide is extremely difficult for people to detect. Exposure to concentrations as low as 100 ppm can be dangerous; higher levels of exposure can be life threatening. In industry, the gas is routinely found in mining facilities, oil and gas plants, petrochemical facilities, steel plants and wastewater treatment plants. It is also major potential hazard when personnel are required to enter confined spaces and therefore effective CO detection is vital.

For more information, go to www.citytech.com

Enhanced Gas Detection

XTRALIS has enhanced its Vesda ECO gas detection product, which is a gas detection extension of its aspirating smoke detection (ASD) system, which is used in over 400,000 early warning and detection applications worldwide. The enhancement includes six new gas detection options, as well as additional programming, testing, and monitoring capabilities.

The Vesda ECO approach to gas detection utilises multi-hole aspirating technology that, the company says, provides superior gas detection and removes the guesswork in gas detector placement. By utilising a Vesda pipe network, ECO is claimed to offer a significantly lower total cost of ownership, citing savings of up to 46 percent on initial capital expense, and up to 76 percent in operational expenses when compared with conventional gas detectors.

The new gas detection capabilities are for alcohol, gasoline vapour, pentane, chlorine and carbon dioxide, along with additional oxygen and ammonia sensing. The new version also adds an intuitive calibration process, field programmable "calibration due" notifications, and a simulation capability of gas tests to analyse the system's functionality and performance.

For more information, go to www.xtralis.com

System Cuts Installation Costs

Cost saving, simple to install and reliable, are the claims being made by COOPER FULLEON for its new Radio+ wireless fire detection system. The addressable 250-device system is said to be compact, boasts best-in-class operating distances and complies with the requirements of EN54-25.

Requiring only limited cabling, wireless technology significantly drives down installation time and costs. This allows the facility to be returned to use more quickly – an ideal solution for sites where vacant periods are short, as in education or healthcare buildings. The use of multifunction components means there are fewer points to install, leading to further economies in the installation process.

Where preserving heritage sites and precious décor is a concern, the lack of invasion into the structure reduces disruption and avoids the need for costly and time-consuming restoration. At the same time eradicating the risk of dust and rubble entering areas such as sterile and food preparation areas where cleanliness is paramount.

When evaluating if a site is suitable for a Radio+ wireless system, the easy-to-use survey kit scans all available frequencies to ensure good signal quality between the panel location and the desired location of each individual remote device. The handheld unit provides a simple LED indication of "pass/fail" and also a digital readout of signal and background levels. It also records results for later analysis.

Older properties often have a more solid construction than contemporary buildings so the radio signal range can be limited. The new Wireless Booster panel overcomes this. A seamless extension to the Radio+ system, each wireless booster operates its own dedicated wireless loop of up to 28 devices, which will synchronise with other wireless devices reporting directly to the main Radio+ panel.

A new three-channel wireless input/output unit has been developed to provide interfacing with other systems and wired components, it provides three independent monitored inputs and 3 volt free outputs controlled by the Radio+ control panel using "cause and effect" programming.

For more information, go to www.cooperindustries.com

Mega-mall Cabling in Dubai

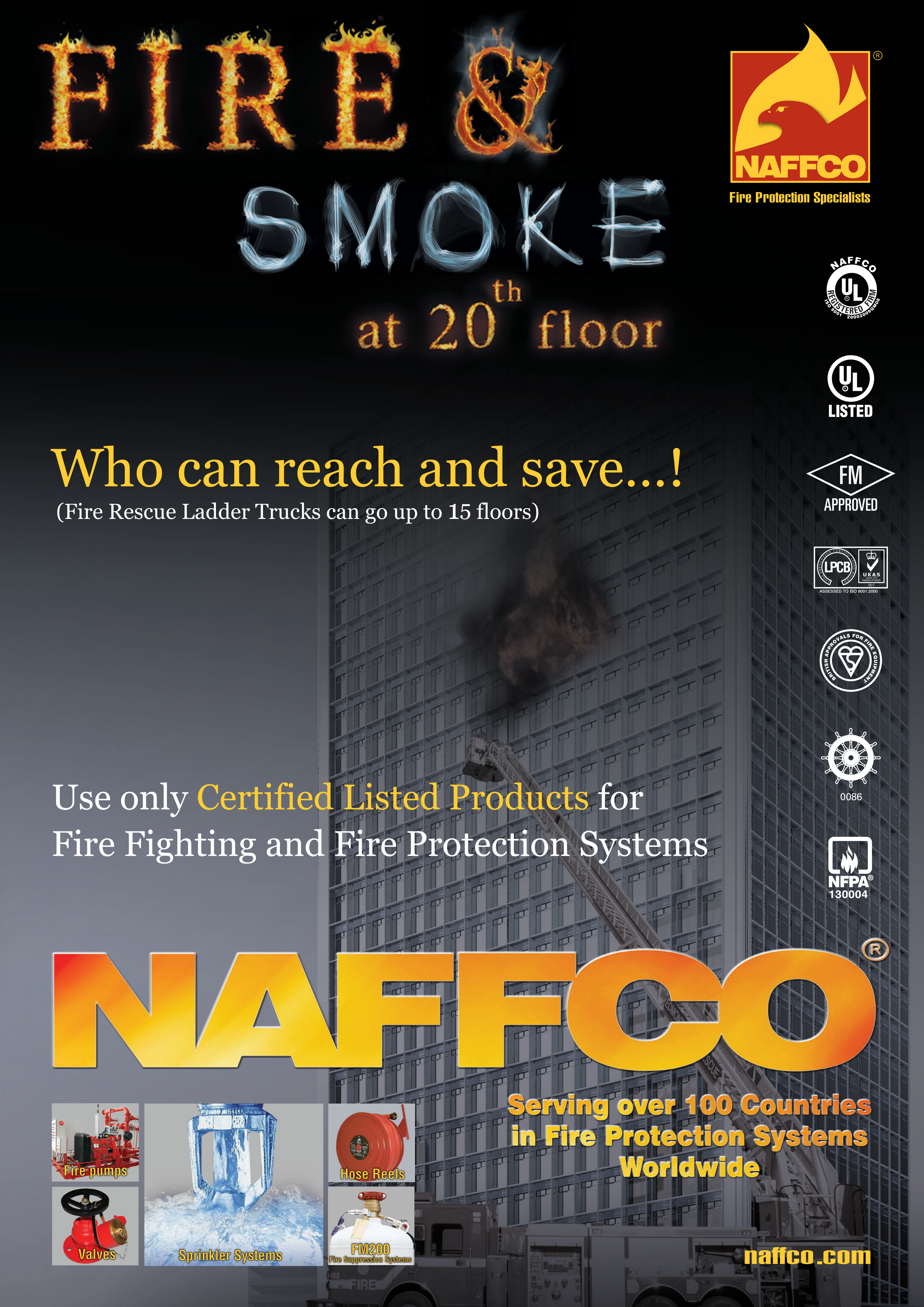
DRAKA cable has been installed throughout the four-storey Dubai Mall in the UAE – at 1,124,000 square metres, the world's largest floor-area shopping mall attracting well in excess of 40 million visitors a year. The company supplied in excess of 20 kilometres of cable utilising its FTP fire-resistant power cables, Firetuf FT30 fire-resistant alarm cable and Firetuf FT Sifer fire-resistant power cable.

The cable was specified for the Mall's fire detection and alarm system, the public address system, smoke detection installation, fire suppression sprinklers, the standby power supply power supply for the emergency extract fans and fire curtains. Significantly for such a prestige project, all of the Draka cables are third-party approved by such internationally

renowned organisations as BASEC (British Approvals Service for Cables) and LPCB (Loss Prevention Certification Board).

The project was developed by Emaar Properties, is part of the huge US$ 20 billion Burj Khalifa complex, includes world-class leisure and entertainment facilities and 1,200 shops that have a total floor area the equivalent of 50 football fields. The main contract for the mall was undertaken by a joint enterprise comprising Dutco Balfour Beatty and Al Ghandi CCC; DP Architects (Singapore) was the complex's main architect and the project manager was Turner Construction International.

For more information, go to www.drakauk.com


FIRE & SMOKE
at 20th floor
NAFFCO
Fire Protection Specialists
Who can reach and save...!
(Fire Rescue Ladder Trucks can go up to 15 floors)
Use only Certified Listed Products for
Fire Fighting and Fire Protection Systems
LISTED
FM
APPROVED
LPCB
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Fire pumps
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Serving over 100 Countries
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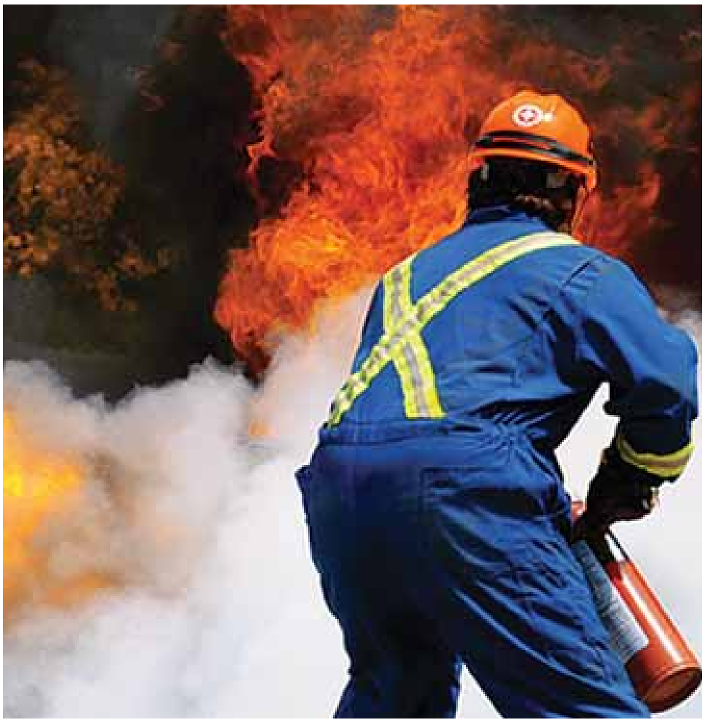
K V Fire – A major Force in the International Marketplace

For more than two decades, K V Fire Chemicals has specialised in the manufacture and supply of firefighting and fire suppression chemicals, in particular powders and foam concentrates.



In addition to being one of India's premier specialist fire protection companies, K V Fire Chemicals has created a considerable presence, particularly throughout the Asia Pacific region and the Middle East. It currently has a customer base spread across 38 countries and has ambitious plans to develop other markets across the world.

Today, its key markets include the petrochemicals industry, defence, aviation, power generation, manufacturing industries, maritime applications and both municipal and industrial fire and rescue organisations. In addition to its core products of powders and foam concentrates, the company's expanding portfolio includes: portable fire extinguishers; foam production, storage and delivery hardware; and the latest development – water mist technology.

The K V Fire Chemicals foams offering includes, among many others: AFFF concentrates; Class A concentrates; an HEF concentrate developed specifically for fighting engine room and aircraft hangar fires; and a Class K foam for oil and fat fires. In terms of foam generation and delivery hardware, the company's comprehensive line-up embraces: foam makers; sprinklers; chambers; bladder tanks; and bladder proportioners. The company also manufactures a mobile foam delivery unit that comprises a foam inductor, foam branch pipe, a concentrate storage tank and two lengths of fire hose.

The current widely-approved dry powder offering from K V Fire Chemicals includes the UL Classified KV Lite POWEREX, which is now used extensively by its customers in portable fire extinguishers, fixed delivery systems and power cannons. The company's portable fire extinguisher range includes both standard fire risk and special application models that are UL-listed and come with a six-year guarantee.

The latest addition to the K V Fire Chemicals portfolio is a water mist system – the K V Fire Ultra Mist system – which is available as a portable 15-litre (30kg) back-pack system or 50-litre (100kg) trolley-mounted unit. Both of the low pressure systems are dual mode and can deliver the water mist as either a jet or a fog.

This clean agent water mist system reflects the company's on-going commitment to developing, manufacturing and marketing fire suppression and fire extinguishing solutions with the least possible negative impact on the environment. It also reinforces the company's growing international reputation for manufacturing excellence and producing systems and products that represent value for money, robustness and low in-use cost.

The company, which was established in 1988, is headquartered in Navi Mumbai with a 20,000 square metre manufacturing, logistics and development facility in Mundhegaon, Nashik. The company is certified to ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007. IFP

KV FIRE

For more information, go to www.kvfire.com

SEVO Systems Expands Design Capabilities

SEVO Systems has expands its design capabilities for its fire suppression systems utilising 3M Novec 1230 Fire Protection Fluid.

SEVO Systems announces expanded design capabilities for its SEVO 1230 Fire Suppression Systems. Utilising 3M Novec 1230 Fire Protection Fluid. The SEVO 1230 FORCE500 clean agent fire suppression system at 500 psi (34.5 bar) is now the premier replacement for halon and HFCs in fire suppression systems.

SEVO has demonstrated that its systems simplify and reduce the cost of conversion from halon 1301 to Novec 1230 fluid. The FORCE500 provides enhancements that allow even greater flexibility in design capability, for both the retrofit of halon installations as well as in new construction. In over 90 percent of halon or HFC retrofit cases, the existing halon 1301 piping network can be utilised, while only the existing halon 1301 cylinder and the existing nozzles need to be replaced.

These enhancements provide benefits to designers using both the FORCE500 at 500 psi (34.5 bar) and also with SEVO's conventional 360 psi (25 bar) system. The design enhancements for the FORCE500 increases the distance from cylinder to nozzle by 300 percent over other systems on the market, meaning fewer nozzles are required to meet established standards. Only one 64mm nozzle is needed to cover a 500 cubic metre area versus a conventional 50mm nozzle. These enhancements establish SEVO 1230 Systems as the only clean agent fire suppression systems on the market that provide these expanded design capabilities. The FORCE500 is the only one of its kind available for replacing halon and HFC systems with Novec 1230 fluid. All SEVO Systems are approved by Factory Mutual (FM) and are UL/ULC Listed.

SEVO Systems was formed in 2001 to develop and commercialise a revolutionary new technology invented and marketed by 3M that represented a major breakthrough in halon replacement technology – combining high extinguishing efficiency with excellent environmental, health and safety properties.

With the highest life safety margin of any clean agent, zero ozone depletion potential, five-day atmospheric lifetime and a global warming potential of one, Novec 1230 fluid offers the market a long-term, sustainable alternative to halon and HFCs. SEVO worked hand-in-hand with 3M during the early development period following its discovery. SEVO represents a "safe environmental choice" and was the first OEM partner of 3M to commercialise a UL approved fire suppression system using Novec 1230 fluid. SEVO continues to develop new application technology for use with Novec 1230 fluid, revolutionising the industry with ground breaking approaches to sustainable fire suppression.

Novec 1230 fluid is designed to balance the need for extinguishing performance, human safety and low environmental impact. 3M stands behind Novec 1230 fluid by offering an industry-leading 20-year warranty – the 3M Blue SkySM Warranty. For complete terms and conditions or to register your system for the Blue Sky Warranty, visit www.3M.com/novec1230fluid. IFP

SEVO SYSTEMS Safe Environmental Choice

For more information, go to www.SEVOSystems.com

Clean Agent Fire Suppression Systems

SEVO™ Systems set the bar by being the first company to design special hazards fire suppression systems with 3M™ Novec™ 1230 Fire Protection Fluid. Other companies using this environmentally sustainable solution only offer 25 bar (360psi) pre-engineered and engineered systems. We raised the bar by being the only company to offer 34.5 bar (500psi) systems: The SEVO™ 1230 FORCE500™ Clean Agent Fire Suppression System. More pressure allows retrofit of existing Halon 1301 systems while utilizing conventional welded cylinders. Our True Retrofit® solution enables you to use existing piping and meet the requirements of industry standards and specifications by simply changing your cylinders and nozzles.

And again.

Our "plug and play" modular units are less costly than others and easy to install. These pre-engineered, factory-built units, with integrated detection and control, arrive pre-piped and ready to install.

And yet again.

Our mobile refilling stations for onsite refilling—available exclusively from SEVO—ensure your cylinders can be refilled within 24 hours per NFPA 2001 and other international standards. Mobile refills prevent any interruption in protection--no matter where you are located.

We're working hard at continuing to raise the bar. Would you like to learn more? Contact SEVO, the industry leader in mission-critical fire suppression technology.

SEVO™ SYSTEMS
Safe Environmental Choice

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Exclusively Utilizing
3M
Novec™ 1230
Fire Protection Fluid

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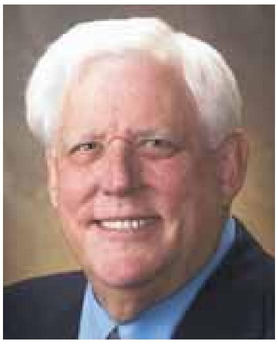
CPVC fire sprinkler pipe undergoing flammability testing

Making a Case for CPVC in Government Facilities



Dennis Lundstedt

As one of the largest land owners in the world, the U.S. State Department has nearly $18 billion worth of properties located in hundreds of countries around the globe and is responsible for building and retrofitting more facilities than any other organization. With so many buildings under its control, the U.S. State Department had faced the potential of substantial fire losses as the result of everyday fires, and additional losses resulting from terrorist attacks.

In an effort to mitigate the loss of human lives, as well as a significant amount of fire-related property damage, beginning in the mid-1980s, the State Department undertook an aggressive fire protection campaign that resulted in a large number of fire sprinkler system installations in many of its existing, as well as new embassies and consulates.

For eight years, my job as Director, Global Fire Protection Programs, and Senior Fire Protection Engineer for the U.S. State Department, was to oversee the hundreds of installations that occurred in places as widespread as Baghdad, Bangkok, Beijing, Bombay, Budapest, Calcutta, Frankfurt, Lima, Madrid, Manila, Naples, Panama, Paris, Prague, Rome, San Salvador, Tel Aviv and Vienna, to mention just a few.

Time was a critical factor in accomplishing this global fire safety mission as the Government was anxious to reduce its losses and provide a safer environment for its employees. Few people would argue that fire sprinkler systems save lives. So the faster we could get the systems installed, the sooner we could start saving lives. Given the tight time constraints and what I knew of the various fire protection systems from serving on various fire code committees and being involved in fire protection in the U.S. for many years, one piping material emerged as the obvious choice – CPVC.

Chlorinated polyvinyl chloride, which is the official name for CPVC, is a high-performance proven thermoplastic with more than a 50-year track record in international piping applications, CPVC pipe and fittings provide the reliability, ease

of installation and cost savings that allowed the U.S State Department to complete its fire sprinkler system installations in the shortest time period and at the lowest total cost, without sacrificing quality.

Cost alone was not an overriding factor, although the lower cost of material and dramatically lower labour costs that resulted from the fast and easy installation process did allow the Government to protect more overseas embassies and consulates under the specified budget. Since the teams of special American installers were paid by the day, a faster installation process that could save up to 50 percent of the total time required for the installation could translate into major cost savings. By driving the cost down, it made it an easy decision to move forward with additional installations.

CPVC pipe and fittings have always been competitively priced and represented a good value, even before steel prices started their most recent escalation. I could buy all the products for the sprinkler systems, including the pumps, transport them to another country along with our approved contractors, and still be up to eight times less expensive for every square metre installed with a CPVC compared with a steel piping system.

Cutting steel takes time. You have to groove it, thread it, carry it into the building and screw it into the coupling possibly through the use of a special clamp. If anything has changed on site and the pipe needs to be re-cut by even a few millimetres, the process begins again. If CPVC pipe is too long, you simply cut it on site in a fraction of the time. In addition, CPVC pipe can be attached directly to the wall or ceiling. Steel pipe, in contrast, requires split-ring hangers. It is more difficult to conceal by getting it close to the wall or ceiling because you have to get a pipe wrench around it.

The lighter weight of the CPVC material, which is typically one-sixth to one-eighth the weight of comparably sized steel pipe, creates additional savings from an engineering standpoint. Structural engineers have to account for weight within every building. If you take multiple pieces of pipe and fill them with water, the additional weight is substantial enough to affect the load-carrying capacity of the building. Although the weight of the water remains the same, the weight of the pipe material in a ratio of roughly six-to-one can translate into a large cost savings when designing the building.

Long-term Performance

Beyond cost, however, what made CPVC pipe and fittings the material of choice for so many U.S. embassies and consulates around the world was their proven performance over the long-term. Even in the embassies with installations dating back to the 1980s, the CPVC systems continue today to function fully with little to no maintenance or repairs necessary.

Part of the reason is their natural corrosion resistance even against Microbiologically Influenced Corrosion (MIC). Given the right water content, the process of metal corroding and degrading creates an atmosphere conducive to small bugs that live in the water and actually eat the metal. This results in pinholes and premature failures that can result in millions of dollars in damages. MIC is not a problem limited to certain countries or water supplies; it is seen around the world. MIC, however, is not a problem for CPVC, because the microorganisms that live in the water do not eat thermoplastic. And even in coastal areas with salt water that can cause external corrosion on metallic pipe, CPVC offers a reliable alternative because it resists corrosion inside and out.

Such reliability has, in some instances, even stood the test of earthquakes. This was the case in San Salvador in the 1980s when an earthquake measuring 7.5 on the Richter scale hit the embassy shortly after a BlazeMaster CPVC system had been installed. Property damage to the surrounding buildings was massive. The five-story embassy was flattened down to two stories. Yet, the CPVC system remained largely intact. Had it been

BlazeMaster®
FIRE SPRINKLER SYSTEMS

Listed and approved for more types of applications than any other non-metallic system

- **Decrease in installation time**
- **Higher occupancy rates**
- **Scale and corrosion resistant, used in many seaside high-rise apartment buildings**
- **May allow for pipe downsizing**
- **Light weight material**
- **Cleaner installations versus metal**
- **Easily fabricated in field**
- **Installation training provided**

For reliability, ease of installation and cost-efficiency, more building owners choose BlazeMaster® CPVC Fire Sprinkler Systems for use in high-rise, hospitals and educational facilities.

No overhead sprinkler system is easier to install than a BlazeMaster CPVC system. From the inventors of CPVC, BlazeMaster pipe is made from a lightweight, semi-flexible material that needs no pre-fabrication and alterations can be handled on-site.

With more than 1 billion feet (300 million meters) of piping systems installed in more than 50 countries since 1984, and with more listings and approvals than any other non-metallic fire sprinkler piping system, BlazeMaster is the most recognized and specified non-metallic fire sprinkler piping system in the world.

For fire protection that's corrosion-resistant, longer lasting and easier and less costly to install, visit **www.blazemaster.com**.

Lubrizol

Unlike other plastics, CPVC pipe simply chars at the ends when exposed to an external flame. It does not continue burning once the flame source has been removed

needed, local authorities believe it would have been fully functional in the event of a fire. Although it is uncertain that a CPVC system would always remain operational during and after an earthquake, I was impressed to have observed its superior performance in San Salvador.

Installation Issues

The CPVC material further proved that it was highly forgiving when working around unusual shapes and structures. Many of the buildings, especially those throughout Europe, are historical with huge vaulted ceilings and major architectural obstacles. CPVC pipe and fittings were ideal for these types of structures with so many encumberments because they are more flexible than metallic pipe.

In looking at retrofits such as these, the CPVC system offered the additional benefit of being able to keep the buildings fully operational throughout the installation. Unlike a metallic installation that involves disruptive noise, heavy equipment and the added fire risk associated with the welding procedure, a CPVC installation is fast, quiet and clean without any fire risks.

The easy solvent cement joining process is also valuable when repairs are required as a result of explosions or attacks made on some of the embassies. When the CPVC fire sprinkler system sustains damage, it is a fast and easy fix. Simply turn the water off at the closest point to the repair, drain the water, cut the pipe and re-join. The easy-to-understand procedure is typically outlined in the manufacturer's installation guidelines.

Speaking of manufacturer's guidelines, it is important to choose a manufacturer and/or pipe supplier that offers a comprehensive training program. Especially in those situations where the installation relies on local labour, a well-planned, step-by-step training program is critical to ensure a successful installation. Sufficient training, combined with the system's simple installation process, means there is less chance for installer error, even in Third World countries where contractor education is not as extensive as in the U.S.

Nearly 30 years of experience has proven that CPVC installs significantly better than steel from a quality standpoint. In fact, the solvent cement joining process results in a joint that is actually stronger than the pipe or fitting alone. This compares favourably to other piping materials, including steel systems, in which the joint is often the most vulnerable to leaks and failures.

We also found the material quality to be more consistent when using CPVC. In some areas of the world where we tried to use steel, we were challenged to find consistent-quality indigenous steel. In order to meet the quality requirements necessary for a successful installation, we had to purchase it in the U.S. and transport it overseas. Given the weight of the steel, this added a significant percentage to the total project cost.

There are other options to steel beyond CPVC, and they were initially considered. In the early years when CPVC was first introduced to the market, we also looked at polybutylene. But for all the reasons cited in this article, it was determined that CPVC was a superior material. In retrospect, given the highly publicised problems that occurred during the 1980s with polybutylene pipe, it was a very smart decision.

CPVC pipe and fittings have always been competitively priced and represented a good value, even before steel prices started their most recent escalation. I could buy all the products, transport them to another country along with our approved contractors, and still be up to eight times less expensive against a steel piping system.

Fire Performance

CPVC pipe and fittings also offer superior flame and smoke characteristics, which is especially important since they are used as part of a life safety system. CPVC piping systems cannot support combustion. Nor can they propagate a fire due to their natural insulating properties that prevent the transfer of heat. In order to sustain a flame, these products require more oxygen than that present in the earth's atmosphere. While the pipe and fittings will char when exposed to an external flame, the charring becomes a thermal barrier which then restricts the flow of heat into the wall and further reduces the rate of burning. In addition, CPVC pipe and fittings produce far less toxins when burned than many common materials. In fact, the smoke from CPVC pipe and fittings is less toxic than wool and cotton and is no more toxic than wood.

CPVC fire sprinkler systems have a proven track record with a nearly 30-year history since the first CPVC fire sprinkler pipe and fitting compound was created by The Lubrizol Corporation in 1984. This track record contributed to the conclusion that CPVC products were the right choice for the U.S. Government. Today, almost three decades and more than 100 installations later, I can honestly say it is the best piping material for new, as well as existing, government buildings. IFP

Dennis Lundstedt is the recently retired Director, Global Fire Protection Programs, and Senior Fire Protection Engineer for the U.S. State Department

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What's New in Panels?

Designers of alarm and control panels continue to develop new and improved solutions. Here we look at some of the latest technology to come on stream.

Graham Collins

Advanced Electronics Global Launch

ADVANCED ELECTRONICS is now into phase two of the Mx-5000 series product launch. The first release of the project was rolling out standard manufactured products into the Germanic market utilising the Apollo protocol. The next stage is now underway supplying the international trade supporting all protocols (AV, Hochiki ESP and Nittan Evolution).

Advanced technology brings the Mx-5000 series to the next generation of analogue addressable fire control panels. The integrated product range has been designed around the latest microprocessor technology comprising a single loop, dedicated two-loop and four-loop control panel series that also includes a number of remote terminals and dedicated peripherals.

The latest panel features include a new and improved menu structure enhancing trouble shooting for on-site engineers with the aid of an on-board scope. An on-board fire system database for service and maintenance provides a comprehensive resource and in-depth analysis of devices such as isolation, installation, test and drift history making a complete service management process a user friendly experience.

In addition to this product line, the alpha numeric LCD display now supports Russian, Greek and other eastern European language character sets and includes a common PC-NET software package for easy language translation. As with all other PC-NET software

For more information, go to www.advel.co.uk

Networkable Panels from C-Tec

All C-TEC's XFP networkable analogue addressable fire alarm panels are Loss Prevention Certification Board (LPCB) third-party approved, demonstrating that all six of C-TEC's XFP panels have been extensively tested for functionality and performance and comply with EN54 Parts 2 and 4.

The XFP range is ideal for office blocks, shopping complexes and big industrial sites as well as smaller, stand-alone applications. Available as a cost-effective single loop 16-zone panel in a plastic enclosure or a robust one-loop or two-loop 32-zone metal panel, XFP panels offer an array of features including full compatibility with Hochiki's ESP and Apollo's XP95, Discovery and Xplorer protocols, two independently programmable conventional sounder circuits and the ability to interconnect up to eight XFP main panels onto a two wire RS485 network.

For more information, go to www.c-tec.co.uk

Conventional C-Tec Offering

C-TEC's new-look CFP Standard conventional panels now feature stylish and easy-to-use interfaces, combined keypad/keyswitch entry as standard and integral EN54-4/A2 switch mode power supplies.

In addition, the panels now have extra on-board fire and fault relays. Crucially, all standard CFP panels have been re-certified to the latest versions of EN54 parts 2 and 4 by LPCB, which demands additional functionality such as battery impedance monitoring.

C-Tec's MFP four-zone to 28-zone BS fire panel was designed to fill the gap between low cost, low specification fire panels and higher priced, higher specification equipment. Expandable from in four-zone steps, the MFP's balance of features (four sounder circuits, head-out fault indication and two on-board fire relays) plus its compatibility with a wide range of expansion boards makes it one of the most sophisticated BS5839-4 compliant fire panels available.

For more information, go to www.c-tec.co.uk

Kentec's LED Indicator Panel

KENTEC'S Syncro Ident LED indicator panels provide a compact and attractive means of displaying up to 24 additional indications at separate locations to the main fire panel via the panel's auxiliary RS485 serial bus.

As with all inputs and outputs on the Syncro system, each indicator is fully programmable to indicate a variety of events as well as being fully programmable via cause and effects to operate in response to logically connected inputs. Each indication defaults to a zonal fire indicator but may be configured via the loop explorer configuration utility to operate upon any event type or combination of inputs.

Syncro fire panels are capable of controlling up to 500 outputs via the auxiliary RS495 serial bus and are therefore capable of providing up to 500 Syncro Ident indications per panel. Slide-in labels allow the indicator legends to be created or changed with ease.

For more information, go to www.kentec.co.uk

Synchronised Solution from Kentec

The KENTEC Syncro AS single or two-loop analogue addressable fire control panel is characterised by easy-to-configure expandability, supports open protocol communications, including Apollo, Argus Vega and Hochiki, and uses leading edge microprocessor-based electronics

It connects seamlessly to up to 63 other Syncro AS, or Syncro multi-loop panels and repeaters via the fully fault tolerant and robust Syncro network. A dedicated serial communications bus is also available for connection of a range of I/O modules including a 16-channel general purpose I/O board, a six-way sounder board, an eight-way relay board and a four-zone conventional detector interface. The panels RS232 serial interface port can be used to connect to a printer, computer based graphics system, modem, pager or, via third party interfaces to BMS systems.

Kentec's Syncro Matrix fire alarm mimic display technology uses flexible, fibre-optic light guides to illuminate areas on a fire alarm mimic display floor plan. Uniquely flexible and future-proofed, it completely dispenses with wiring, enabling indicators to be moved, removed or added on site. On this conventional version of the Sigma Matrix, all indicators can be configured to operate via switched positive or negative inputs providing compatibility with a wide range of input/output boards.

It uses high quality, full-colour or monochrome floor plans, the zonal displays have a capability of up to 500 indicators, with standard enclosures capable of housing 24, 56 or 88 LEDs.

For more information, go to www.kentec.co.uk

Bosch Integrates Detection and Evacuation

BOSCH'S Fire Panel 1200 series for smaller facilities supports up to 254 peripherals, while a networked solution with the Modular Fire Panel 5000 Series can accommodate up to 32.000 peripherals. Both systems are based on high-quality panels and peripherals, designed for earliest detection. They feature advanced detectors, interface modules, manual call points, sounders, and other peripherals.

The system is designed for expandability, and all the devices and peripherals work seamlessly together. In smaller applications, a flexible RS-232 interface is used to integrate the components of the Fire Panel 1200 or the Modular Fire Panel 5000 Series and the Plena voice evacuation system. In larger applications, an open interface, based on standard protocols (OPC and Ethernet) integrates the Modular Fire Panel 5000 with the Praesideo, public address and emergency sound system, through a building management system for advanced control. A direct connection is also possible.

The security chain is fully EN-certified (approved for EN54-2 and -4 for fire and for EN54-16, EN60849 and ISO 7240-16 for EVAC),

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Fike Offers Two-Wire Fire Protection on TwinflexPro

The new LPCB-approved TwinflexPro fire alarm control panels from FIKE features an integrated event log, a key switch control access facility, a wide range of delay functions and a convenient PC setup option. The new panels were developed to provide flexible and effective fire protection at an affordable price for small and medium-sized applications, such as private hotels, guest houses and homes of multiple occupation (HMOs).

Like all fire control panels in the Twinflex range, the new TwinflexPro panels allow detectors and sounders to share the same wiring, which simplifies installation and significantly reduces costs. The new panels are available in two-zone, four-zone and eight-zone versions, with support for up to 32 devices per zone. All sizes of panel share the same attractively styled enclosure, and four-zone panels can be upgraded to eight-zone in the field.

TwinflexPro panels feature an integral data log that stores information for up to 500 alarm and fault events. The information can be recalled to the panel's LCD display or downloaded to a PC, making it easy to investigate the sequence of events leading to alarm activations. The data log is also an invaluable aid to maintenance and fault finding.

Of particular interest to installers, the new TwinflexPro panels provide two monitored outputs that can be configured as conventional sounder circuits, a feature that makes the panels well suited for use when upgrading existing conventionally wired installations. A versatile delay function is also incorporated, which can be applied to any output. Setup can be performed either from the front panel or via a standard PC. The panels fully support Fike's intelligent Twinflex protocol, which allows them to discriminate between alarm signals generated by automatic detectors and those produced by manual call points.

For more information, go to www.fike.com

Morley-IAS Networkable System

In what the company sees as its most important product development initiative in many years, MORLEY-IAS BY HONEYWELL has launched a new DX ConneXion range of networkable fire alarm panels.

The new range incorporates a number of enhancements over the Dimension panel that it replaces. It offers fast-track set-up, optional true peer-to-peer fault tolerant redundant network, and is a modular concept, allowing zone expansion, key switch and larger batteries. The EN54-compliant network supports up to 16 loops, using any combination of one, two or four loop panels, while a PC tool simplifies text entry through the ability to import text from M/S Excel spread sheet.

It supports three industry-leading device protocols – Apollo, Hochiki and System Sensor – and is fully backward-compatible. The PC tool can also download and convert an existing DX configuration and upload into a ConneXion panel, enabling easy upgrade or retrofit applications. Other features include a mobile phone-style keypad and navigation keys that makes text input at the panel more intuitive, with end-user keys in one logical group, pictorial instruction button logos ensure easy identification and navigation, and simple to use and understand on-screen end-user instructions, including an 'are you sure?' confirmation prompt before taking evacuation or other action.

For more information, go to www.morley-ias.co.uk

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New York Times Building Sets New Standard

The New York Times building stands as one of the most spectacular additions to Manhattan's skyline. The 52-storey tower, has won plaudits around the world for its unique, exposed steel "exo-skeleton" design and energy-efficient innovations.

New coatings technology used in the building's construction makes the building the first commercial high-rise structure in New York City to employ fire protection that goes beyond the standard ratings for cellulosic fires. This technology provides protection against extreme heat fires and blast pressure generated by major catastrophic events, and is derived from International Protective Coatings fire-protection material, formulated to protect steel structures from hydrocarbon and jet-steam fires in the oil, gas and petrochemical industries.

Research and development teams at International Protective Coatings used this proven coatings technology as the basis for the development of the next generation of epoxy-based intumescent fire protection, designed for use in the commercial building industry. The formulation provides excellent fire and anti-corrosion protection, but with the constructability and aesthetic versatility needed for exposed steel designs and multiple-application environments.

The design features a glass curtain wall screened by ceramic tubes, yielding an energy-conserving structure rising to 319 metres at the top of the mast, and the epoxy intumescent coating, combined with high-performance primer and topcoat materials, provided long-term protection to the skyscraper's structural steel.

Intumescent Coatings – A Technology Revelation

Intumescent fire-resisting coatings are paint-like materials that are applied to structural steel, and are designed to provide an insulating barrier between the steel and a fire. In the event of a fire, a chemical reaction causes the cured coating film to "intumesce," or expand rapidly to many times its original thickness, and generate a foam-like or char layer that acts as an insulating barrier to prevent or at least delay failure of the structural steel.

Intumescent coatings provide extra time for evacuation of the building and extinguish the fire. These formulations are typically composed of a film-forming polymeric binder, such as an epoxy or acrylic resin; a combination of chemical agents that react to trigger the fire-induced expansion of the coating film; pigments for opacity and colour; and other additives typically found in conventional coatings to provide application, cure, and long-term performance and appearance properties.

Some intumescent coatings require the addition of a reinforcing mesh when applied on specific structural shapes to ensure the integrity of the insulating or char layer.

The use of intumescent coatings has expanded significantly in the architectural and design communities, thanks to paint-like appearance properties of

these materials, as compared with mineral-based, spray-applied, fire-resistive materials (SFRMs).

Two offsite field tests at the New York Times Company's Queens facility, were conducted using steel mock-ups to assess the application, performance, and aesthetic characteristics of the coatings. It was found to offer construction advantages with both time and cost savings. The epoxy intumescent can be spray-applied in just one coat at a thickness of 80 or 120 mils (2000 or 3000 microns), depending on the dimensions of the steel beam or column and then back rolled to achieve the desired aesthetic look specified by the architects. Approximately 79,379 kilograms of intumescent coating was used on the structure, without the use of mesh reinforcement. Combining this with a high performance primer and finish coat gave a high degree of fire protection while also offering long-term durability and long-term colour and gloss retention in exterior exposures to the 23,226 square metres of exposed steel, corner columns and cross beams.

The Process

Initial application of the intumescent coating began after the first ten floors of the 52-floor structure had already been erected. The organic zinc primer was shop applied to the steel, which was then transported to site for erection.

While the intumescent fire protection was selected for its long-term performance, safety, and aesthetic capabilities, the technology also provides the building industry with the options of field or fabrication-shop application, offering building owners a choice of installation environments. Advantages associated with shop application certainly should be given serious consideration, as weather constraints and other onsite issues and equipment expenses, slow productivity.

Additionally, architectural and engineering specifiers are increasingly seeking materials that support sustainable design methods. The fire-protective intumescent coating applied to the Times building is 100 percent solids, with zero volatile organic compound (VOC) content. IFP

For further information, go to www.akzonobel.com

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Fire Pump Remote Monitoring

The outbreak of a fire is no time to discover that your fire pump is not working.

David Gentle

SPP Pumps

We live in an era that is resolute on improving energy efficiencies, saving costs over the long-term and frequently providing incentives in the short-term to make this a more appealing and achievable target. At first glance it is hard to see how fire pumps would fall into this trend. Fire pumps generate no revenue. There is no obvious cost improvement or means to add productivity to a business by installing them or maintaining them, nor is there the opportunity to raise an employee profile through working with them. Put simply, where is the incentive to invest time or capital in something that gives no financial or personal return?

Start with the basic physical characteristics of a fire pump and immediately many people will wonder why much of what they see is required to be quite so big. When compared with their standard, industrial counterparts, the oversized bearing and shafts, back-up components and explosive behaviour upon initiation only add to their reputation of being a prima donna of the pump world.

Add to this an intensive maintenance regime comprising bi-annual servicing, weekly checks as well as insurer audits and it is no wonder that such association leaves behind some resentment and corner-cutting. This is amplified in the current economic period with those chosen to assume fire pump responsibilities likely to be juggling very differing duties the same day, such as stacking shop floor shelves one minute or providing site security the next.

The above provides a taster of what it means to work with fire pumps each week, but imagine how you would you feel if your fire pump did not start when you most needed it to – in the event of a fire?

This assumes the person responsible is even aware of the requirement in the first place. A fire pump's availability to run is everything, yet even if all weekly checks are carried out correctly these checks still only guarantee the fire pump is working for the 0.3 percent of the week!

Some people find reassurance in not running the pump each week and favour the view that running the fire pump manually for any period, even to the minimum recommended duration, actually causes more harm than good and decreases the overall longevity of the unit.

The nature of the fire pump is to meet the demands put in front of it. It is designed for intermittent running – it has an oversized construction, the bearings are specified to run over their life time in excess of thousands of hours, the impellers are well balanced and it has the ability to go from dormant to full load within seconds. It will run and run with the sole purpose of putting out a fire, not failing safe for any reason. As a result it is not uncommon to see fire pumps in operation, running each week satisfactorily as they have done for the last 40-plus years.

The issues that might result from a routine check, such as fuel depletion, engine coolant water loss, valves being left shut or an isolator being left in the off position for example, are not insurmountable obstacles if these issues relay the right information to the right people, right when it is needed.

FireEye fire pump remote monitoring provides warning SMS messages and emails of system events such as low fuel, battery failures, operators leaving the system off-line or jockey pumps starting up too many times. Critically, as fire pump systems are designed to run to destruction, FireEye will inform every time the pump starts – ensuring that false starts do not result in a large bill. Compare this with a replacement engine that could

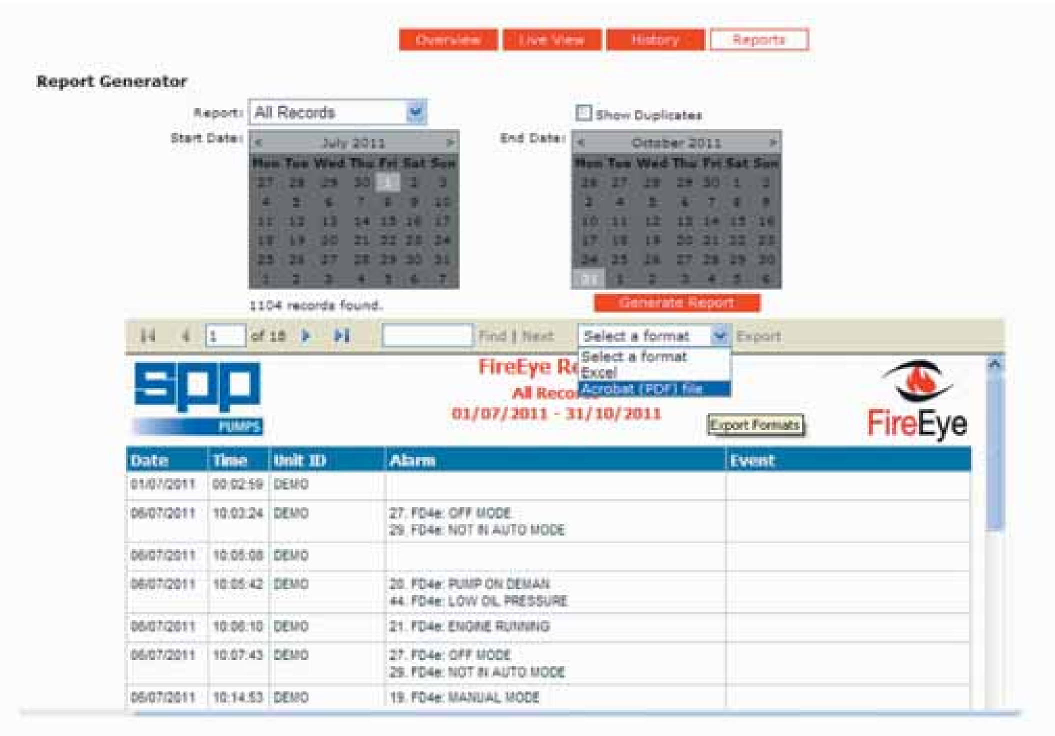
Go back and see alarm states in the event history or search events by categories such 'Service', 'Jockey Pump' or 'All Records'

cost up to £20,000, not including the cost of additional insurance premiums or business disruption, and suddenly the incentive to both the company and the fire pump operative is much easier to quantify.

The FireEye web portal is available from any internet connected computer or smart phone anywhere in the world and allows users to check the status of any measured parameter on the fire pump system without having to drive to the site. This again can reduce, if not eliminate, call-out visits and associated costs therefore increasing efficiency and saving money for all respective parties involved in this process.

FireEye can be retrofitted to any electric or diesel-driven fire pump system giving the ability to pre-empt potential equipment failures and to warn of adverse operating conditions. Monitoring the number of jockey pump starts, and receiving an alarm message if this number exceeds a predetermined amount, is a simple but effective early indicator in identifying a system leak and could save jockey pump burn-out and main fire pump set initiation. In these ways FireEye is proving a cost effective addition to a wide range of installations across the UK and overseas, improving maintenance, performance and longevity.

The extremely cold weather experienced in many parts of the world last year has meant many protected sites want to keep a closer eye on pump house temperature and to be alerted if there is any chance the thermostat, radiator or any other component with the pump house may have failed to perform. Alarm messages to mobile phones can be driven from digital or 4-20mA analogue devices that can be viewed easily through the FireEye website at www.sppfireeye.com, showing status and searchable history as well as reports providing details of events for insurance reports. IFP



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David Gentle is Business Development Manager – Industrial Fire, Northern Europe at SPP Pumps

For further information, go to www.spppumps.com

Just How Fire Resis

Ductwork at Gatwick Airport

Bob Chapman

When is a fire rated duct not fire rated? Are those responsible for a building's fire rated ductwork fully aware of the legal obligations and exactly what they are buying?

The primary function of a fire resistant ductwork system is to ensure compartmentation is maintained. Where the duct passes through a compartment wall, or floor and compartmentation cannot be achieved by the use of fire dampers or fire resisting enclosures, fire resistance must be achieved using fire resisting ductwork.

The fire rated duct in question should maintain, at the very least, the required integrity rating being provided by the structural element through which it passes. Consider the following:

What temperatures are Ducts Required to Withstand?

BS 476 and EN 1366 fire curves follow the ISO 6944 cellulosic fire curve, which dictates that after certain time periods ('fire times') have elapsed, specific temperatures will have been realised. These 'fire times' and the equivalent temperatures reached are as follows:

30 minutes = 825°C
60 minutes = 933°C
120 minutes = 1,029°C
240 minutes = 1,133°C

In terms of compartmentation, if the wall or floor is required to meet BS 476 (Part 21 or 22) and the duct is tested to BS 476 (Part 24), for the same time period both will provide the same levels of fire resistance. If a wall is rated at two hours then the duct passing through it, if not protected by a fire damper, should also be tested for two hours on the cellulosic fire curve.

Meeting the Demands and Principles of Compartmentation

'Section B5' of the UK's Approved Document B (ADB) of the Building Regulations states that systems 'should be capable of handling gas temperatures of 300°C'.

This gives rise to the misunderstanding that ducts are only required, or expected, to withstand temperatures of 300°C. If accepted as such, what would happen where a duct exits or passes through a fire separating element? The answer is simple – there would be a real risk of compartmentation failure.

Some observers would almost certainly comment: 'what about the cooling effect of sprinklers'

tant is Your Ductwork?

and it could be argued that sprinklers may provide a reduction in the insulation performance of the duct. They would certainly not, however, allow any reduction in its crucially important stability and integrity ratings.

Where fire suppression is utilised, which is the case in the majority of basements, it may be acceptable for the insulation criteria to be 300°C. This requires insulation compliance where a temperature of 300°C on the inside of the duct must maintain a temperature on the outside surface that does not exceed 140°C above ambient. There are a number of systems being marketed as compliant with this. The 300°C principle, however, is only an insulation criterion and does not allow a duct to meet the requirement of BS 476 (Part 24), or the EN 1366 standard, for all the required criteria. In these instances, it is critical that the system is tested for stability and integrity for the full temperature, which at two hours is 1,029°C and not just to 300°C.

It is also important to remember that the whole system, including penetration seals and supports joints, is tested. Yet there are a number of systems being marketed that have only carried out a plate test for 300°C insulation. This again does not comply with the Building Regulations, which confirm the test regime necessary relating to fire resistant ductwork.

In order for fire resistant ductwork systems to be classified as suitable for smoke extract applications, loss of shape under fire conditions must be taken into consideration. Official test reports and assessment reports will confirm if systems meet this demanding criteria. The annexe of BS 476 Part 24 demands that a minimum of 75 percent cross sectional area is retained and, indeed, the EN smoke criteria is even more demanding, requiring 90 percent to be retained.

Ensuring Compliance

ADB makes reference to third-party accreditation schemes, which accept that systems will perform as required in a fire situation. In no particular order, accreditations such as FiRAS, LPS1531, Certifire and the LPC Red Book are good reference sources. Some accreditation schemes focus on the QA system a company employs, while others look at the installation requirements. It is also essential to make sure that the accreditation covers the system being installed. For example, a product may be accredited for ventilation use only and not for smoke extract.

The latest 'Good Building Guide' from the UK's Building Research Establishment (BRE) – 'Installing fire-resisting ductwork & dampers' (GBG 81) – contains some excellent guidance. The new publication illustrates the importance of installing fire-resisting ductwork and dampers correctly, to ensure the safety of building occupants and the protection of property, in the event of a fire.

It includes a checklist decision tree and useful references to more comprehensive documents. It also stresses the benefits of good quality, robust third-party certification schemes. Such schemes include regular audits of factory production control for the product and review the supporting test and assessment evidence for the systems, to ensure they continue to meet the appropriate standards. The guide also states that products should not be installed unless the relevant test/assessment documents have been supplied and confirm that the product satisfies the design requirements.

Fire testing of grease laden ducts

Responsible Contractors

Responsible passive fire resistant duct contractors will make manufacturing and installation details available to all the interested parties. The information should be clearly denoted on web sites, but even here some systems will infer compliance, whilst providing little or no substantiation. The more detailed information that is freely available, the better the selection process.

Approved Document B requires fire resistant ducts to be tested to BS 476, Part 24 (ISO 6944) or the relevant European Standard (BS EN 13501 classification document and the relevant element of 1366 defining test measures). BS 476, Part 24, also requires smoke extract ducts to be tested to meet the time-temperature curve of ISO 834 (Cellulosic). At two hours, this is 1,029°C and all fire resisting ducts must meet this criterion for stability and integrity. Smoke extract ducts are also required to maintain at least 75% of the cross sectional area throughout the test period.

This is already a very stringent requirement, but will become even more onerous from 1st July 2013, when the UK adopts the new European

standards (EN 1366). Ducts will then be required to maintain at least 90 percent cross sectional area throughout the test period.

Ducts should be tested at an approved test house and in the UK this means it must be a UKAS/NAMAS listed establishment.

In order to maintain compartmentation, levels of fire resistance need to match those of the structural element through which the fire resisting duct passes. The regulatory bodies will accept no reductions. Companies with real project experience will therefore prove invaluable at the early stages. Equally important is the experience and calibre of the site installation team. This is reaffirmed by the Building Research Establishment (BRE) Global website, which states that product approval is only 'half the story'.

Accreditation schemes referred to will provide confidence that installations meet all the tested requirements of a particular system and ADB recommends the use of systems that carry suitable third-party accreditations.

To avoid possible pitfalls, early dialogue with the system designers and the building control department/approved inspector to establish levels of fire resistance, should ensure that systems are designed within the agreed criteria and result in

The intent of the RRFSO is to ensure that any changes to the original building structure or its services, must not adversely affect the safety of the premises. The RRFSO makes a named individual or company, responsible for the building's fire safety in an on-going basis. Systems that are immediately identifiable as fire rated minimise the risk of unauthorised modifications. Examples of breaches could be a duct branch that has been carelessly cut in, or an access door installed at a later date in a not immediately identifiable fire rated duct, by a ductwork cleaning company, breaching compartmentation and having serious ramifications for the building's fire safety.

If advice or information is knowingly ignored leading to a failure in the fire performance of any element of installed fire protection within a building, then the responsible person is likely to be found to be just as culpable as the deficient supplier or installer. That person shares liability for the provision of sufficient or correct information required under Building Regulation 38 that tells the user of the building about the fire prevention measures provided in the building. Otherwise, the user cannot make an effective risk assessment under the RRFSO.

Manufacturing and installation standards enable the client, consultant, architect or district surveyor the ability to check support sizes, frequency and cross joint methods, to ensure that duct systems meet tested criteria.

drawings that clearly identify these key issues. Such early understanding and agreement of the performance requirements for fire resistant ductwork will also assist in cost certainty, spatial coordination and the overall smooth running of the installation.

When it comes to fire rated, or fire resistant ductwork, you need to know what you are buying.

Robust internal ISO 9001 accreditation and quality control systems and factory quality control systems should include methods of measuring the fundamentally important elements of any fire rated ductwork system; spray thickness and actual steel thickness. To assist in this respect, sophisticated ultra sound measuring devices are available to measure the thickness of steel used. This gives confidence that the fire rated duct systems have been constructed to the manufacturers' standards and will perform as tested.

Manufacturing and installation standards enable the client, consultant, architect or district surveyor the ability to check support sizes, frequency and cross joint methods, to ensure that duct systems meet tested criteria.

Legal Responsibilities

Much has been said about the UK's Regulatory Reform (Fire Safety) Order (RRFSO) which removes the issue of fire certificates and places responsibility for the fire safety of the building, its occupants and those within the immediate vicinity, under the care of the 'Responsible Person'. This term places a legal responsibility on the 'person' or organisation itself.

In the event of fire, whether or not deaths occur as a result, a court will want to know how every fire protection system was selected; the basis for selection of the installer, whether adequate time was provided for its installation and whether there was adequate liaison between the different parties to ensure it was installed correctly. No ifs, no buts – it's all contained in the Construction, Design and Management Regulations 2007.

The CDM 2007 regulations, enforced by the Health and Safety Executive, concentrate on managing the risk and the health and safety of all those who build, those that use the building, those who maintain it and those that demolish it – cradle to grave.

In BS 9999, the definition of fire resistance is the: 'ability of a component or construction of a building to meet for a stated period of time some or all of the appropriate criteria specified in the relevant part of BS 476 or the relevant BS EN standard'. So, a duct simply tested or assessed to 300/400°C is not fire resistant.

So, the critical factors are to ensure that:

- The proposed system provides, as a minimum, integrity ratings supported by BS 476 Part 24 or EN 1366 test documentation.
- Third-party accreditation is provided.
- The system is tested for both internal and external fire exposures.
- Construction or manufacturing details are provided.
- Certification and current assessments are provided by a UKAS/NAMAS accredited body. IFP

Bob Chapman is a director of Fire Protection Ltd

For further information, go to www.fireprotection.co.uk

4 in 1 1000°c

CREATE AND PROTECT

Secutech celebrates 15th anniversary in 2012

Fire and Safety Taipei highlights disaster prevention, fire prevention and industrial safety.

Secutech, Asia's leading security exhibition that offers a total solution to security channels and business units, will be celebrating its 15th edition in 2012. The show, organised by Messe Frankfurt New Era Business Media Ltd, will be held from the 18th to the 22nd April 2012 at Nangang Exhibition Centre, Taipei, Taiwan and is expected to house 560 exhibitors in an exhibition space of more than 35,000 square metres.

Parson Lee, Managing Director of Messe Frankfurt New Era Business Media Ltd said: "We expect to attract over 26,000 professional buyers from around the world to our 2012 show. Buyers will be able to source partnerships with manufacturers and find the latest products and services from the electronic and information and fire and safety industries."

He added that the industry had shown strong market confidence, evidenced by the fact that 23,782 professional buyers from 95 countries and regions visited Secutech 2011 and that 80 percent of buyers indicated that Secutech was a "must-see" trade fair.

Exhibition Highlights

In response to market demands and recent issues regarding unexpected disasters, a comprehensive range of equipment will be demonstrated at Secutech's associated show – Fire and Safety Taipei.

It includes fire safety, industrial safety, disaster prevention and emergency response focusing on users' needs. Fire and Safety Taipei highlights three zones, which are Disaster Prevention, Fire Prevention and Industrial Safety to enhance networking efficiency for buyers. At the same time, technologies and applications will be featured to update industrial professionals with the latest market intelligence and industry developments.

Also a variety of fringe programmes will be on show to attract large crowds. Government and academic professionals are invited to explore and share various manufacturing and marketing topics at fire seminars 2012.

Made-in-Taiwan Products Fit International Market Demands

MIT (Made in Taiwan) products are well-known for their strong competitive advantage in producing good quality goods at reasonable prices.

Along with the rapid change of life-style, global warming, industrialisation and increasingly unpredictable disasters, Taiwan fire safety manufacturers expend more effort on technology innovation, particularly in strengthening the efficiency, intelligence and eco-friendliness of their products' features to fit international market's demands.

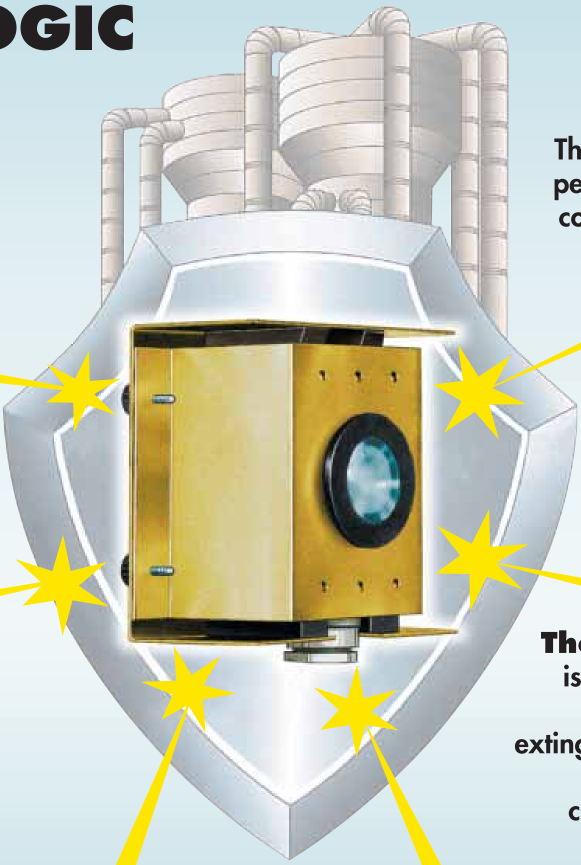
In Fire & Safety Taipei 2012, the MIT product zone will showcase a series of exhibit profiles ranging from active/passive fire protection system and equipment, personal protection equipment and industrial safety equipment to rescue equipment and facilities.

The business-matching events will be arranged at the same time for worldwide buyer delegation groups to ease their sourcing process and generate more business opportunities. IFP

For more information, go to www.secutechfiresafety.com or www.secutech.com

CONTROL LOGIC Spark detector

designed for dust collection systems to protect storage silos from the risk of fire.



Sparks fly at high speed.

They travel at a hundred kilometres per hour along the ducts of the dust collection system and reach the silo in less than three seconds

The CONTROL LOGIC SPARK DETECTOR is faster than the sparks themselves. It detects them with its highly sensitive infrared sensor, intercepts and extinguishes them in a flash. It needs no periodic inspection.

The CONTROL LOGIC system is designed for "total supervision". It verifies that sparks have been extinguished, gives prompt warning of any malfunction and, if needed, cuts off the duct and stops the fan.

ISO 9001

20137 Milano - Via Ennio, 25 - Italy
Tel.: + 39 02 5410 0818 - Fax + 39 02 5410 0764
E-mail: controllogic@controllogic.it - Web: www.controllogic.it

CONTROL LOGIC s.r.l.

BETTER *TO KNOW* IT BEFORE

Eye is faster than nose.

In the event of live fire
the IR FLAME DETECTOR
responds immediately

CONTROL LOGIC IR FLAME DETECTOR

the fastest and most effective fire alarm device for industrial applications

**IR FLAME DETECTOR
RIV-601/FA
EXPLOSIONPROOF
ENCLOSURE**

For industrial applications indoors or outdoors where is a risk of explosion and where the explosionproof protection is required.
One detector can monitor a vast area and responds immediately to the fire, yet of small size.

Also for
RS485 two-wire serial line

**IR FLAME DETECTOR
RIV-601/F
WATERTIGHT
IP 65 ENCLOSURE**

For industrial applications indoors or outdoors where fire can spread out rapidly due to the presence of highly inflammable materials, and where vast premises need an optical detector with a great sensitivity and large field of view.

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E-mail: controllogic@controllogic.it - Web: www.controllogic.it

CONTROL LOGIC s.r.l.

Alarm Technology – Ring any bells?

Bob Choppen

Cooper Fulleon

The primary function of any alarm system is to communicate to people that an emergency exists. The development and evolution of alarm products has been and still is highly dependent on the technologies available. Whichever techniques are used there are only five human senses through which information can be received and of these, hearing and sight are the quickest and easiest to stimulate.

Early alarm devices were largely electro-mechanical, being based on electrical solenoids or motors to create an audible signal, so the range of bells, vibrating horns and sirens available was wide and varied. Though undoubtedly effective, these products were not efficient and often required mechanical adjustment during installation to obtain optimum performance. The "alarm bell" is of course still widely used and alarm product suppliers are able to offer a range of electro-mechanical alarm bells to suit most needs and applications. Given their long history and unique sound it is evident that the general public still associates a bell with a fire warning despite the widespread use of electronic sounders. The popularity of the bell sound has driven manufacturers to make electronic sounders that replicate the ringing tone of a bell.

Sounders

In the 1960s, solid state electronics became viable for the economic design and production of alarm sounders that generated an alarm tone electronically, although it should be remembered that there must always be a mechanical component to turn the electronic signals into a vibration so that it can be heard.

The first electronic sounders were not the efficient compact units that are produced today, as they were based on public address (PA) loudspeakers housed in steel cabinets. However, the realisation that the rocking armature transducer from a telephone handset could be used as an efficient acoustic driver enabled development of the compact units that we know today. Products like Fulleon's Roshni Sounder, launched nearly 30 years ago, relies on a transducer that is still recognisable as the unit from a telephone handset, albeit now specifically manufactured and tuned for use in alarm sounders.

Transducers are not the only technology; Piezo elements are also used, which employ materials that change dimensions when a voltage is applied, and so driving the metal plates to vibrate. This allows sounders to be manufactured with even lower power consumption, but at the expense of a more limited frequency range over which they can operate efficiently.

Efficiency is a key attribute for fire alarm sounders; low power consumption is needed to keep standby batteries to manageable sizes and with addressable systems, where power and data share the same cable, it is vital to stop the communications protocols from being corrupted by

current noise. Today typical current consumption for transducer-based sounders is around 12mA to 15mA for sound outputs of just over 100dB(A) (measured at one-metre from the sounder). The Piezo based sounders, such as Fulleon's Symphoni Sounder, commonly found in addressable systems, can achieve a similar output for as little as 3mA to 5mA.

Flexibility is another key virtue of the electronic sounder; it can produce many different sounds and operate over a wide range of supply voltages. Typical fire alarm sounders have up to 32 alarm tones and operate on voltages from 9Vdc to 28Vdc and even up to 60Vdc in some instances. Most will allow for two stages of alarm, so that the sounder can be remotely switched between different alarm tones to indicate different levels of alarm condition.

Voice sounders like the Symphoni Voice+ are pre-programmed with a set of alarm tones and voice messages allowing the user to choose the best combination of alarm tone and message for their situation.

Although 32 Tones may seem excessive for a sounder, there are so many alarm signals within buildings that distinctive, easily identified alarm tones are needed to allow differentiation between them.

Speech

Sounders are limited in the amount of information they can convey, as an alarm signal is only meaningful if the person hearing it recognises it and understands how to respond. For situations where people may not recognise an alarm signal, such as areas open to the general public, a spoken message is beneficial as it provides a clear warning, while instructing and reassuring those affected by the emergency. It has been shown that the extra information in a spoken message allows people to respond much more quickly than they would to just an alarm tone.

Voice messaging has been used with PA systems for many years; the challenge has been to incorporate the technology into low-powered electronic sounders, as achieved in Fulleon's Symphoni Voice+ product. These voice sounders are not replacements for emergency public address voice alarm (PAVA) systems, but are complements for situations where live voice is not required, or the area to be covered is small and the cost of a PAVA installation is not justified.

Voice sounders like the Symphoni Voice+ are pre-programmed with a set of alarm tones and voice messages allowing the user to choose the best combination of alarm tone and message for their situation. If circumstances require special messages or specific languages, the sounders can be reprogrammed as required. Voice, despite its benefits, can be difficult to apply in real situations as not only must the message be loud enough to be heard, as with any sounder, but also be intelligible. With voice sounders, presently, there is no objective way of measuring the intelligibility level of an installed sounder; the normal techniques used with PA installations cannot be applied as there is no live audio input.

Light

There is an increasing awareness that sounders need to be supplemented by other forms of alarm in areas where people may be hard of hearing or their hearing is impaired by loud ambient noise or

ear defenders. Visual alarms based on incandescent lamps have been used within alarm systems for a long time, but again it was the advent of semiconductor electronics that allowed the familiar flashing beacons (strobes) using xenon flash tubes to prevail. A limitation of visual signals compared to audibles is that, unless bright, they are unlikely to be noticed if they are not in a direct line of sight, whereas sound can be heard whether or not the listener is facing the source.

The Disabilities Discrimination Act (DDA) introduced to the UK in 1995 (now largely replaced by the Equality Act 2010) encouraged the supplementing of audible alarm sounders with visual beacons in certain areas of buildings to warn the hard of hearing. The publishing of European standard EN54-23 in 2010 provided test specifications for beacons, but required much brighter beacons than those used presently, which are often selected for their low power consumption rather than for an effective light output.

Currently, there are no beacons on the market that are specifically designed to meet the requirements of EN54-23 and the challenge for manufacturers is to devise solutions for beacons that meet the requirements of the legislation without taking excessive amounts of power from the alarm system. The existing xenon flash tube technology is effective, but power hungry, however the rapid development of Light Emitting Diode (LED) technology will undoubtedly help to alleviate some of the problems with improved efficacy compared to xenon tubes.

The Disabilities Discrimination Act (DDA) introduced to the UK in 1995 (now largely replaced by the Equality Act 2010) encouraged the supplementing of audible alarm sounders with visual beacons in certain areas of buildings to warn the hard of hearing.

Europe has been accustomed to using red beacons for fire warnings, however with xenon technology a red filter is used to give a red flash, reducing the light output by up to 75 percent. Therefore, to achieve the light output required by EN54-23, the power of the red beacons would have to be considerably increased. By switching to white light, it would enable the full light output of the beacon to then be available.

A concern often voiced about the increasing use of beacons is the potential effect on people suffering with photosensitive epilepsy. The standards for alarm beacons require flash rates of between 0.5Hz and 2Hz (one flash every two seconds to two flashes a second) the lower limit for triggering a photosensitive event is cited as 3Hz so modern beacons complying with EN54-23 should fall below this limit, but if several beacons are in view and not synchronised they could present a composite flash of a higher frequency. Recommendations are that beacons should either be synchronised with each other or should be positioned so that only a single unit can be viewed from any point in an area.

Integration

Integration is now high on the list of desirable features for most alarm products and it is routine to find alarm sounders in combination with a beacon. The installation savings are significant as the contractor is fixing and wiring only a single unit instead of two; the saving is probably greatest in markets such as the UK where the wiring codes of practice are comparatively onerous for fire systems.

Integration can be taken much further so that a single point can encompass a sounder, beacon, multi-function detector and as shown in the picture a wireless communications module and batteries too.

Apart from the installation savings there are also possibilities for enhanced operational features and local data processing within the unit. Higher levels of operational monitoring are also possible, for example there are sounders that are capable of checking their own audible output for correct operation so that the whole of the alarm path is effectively monitored from control panel to sounder.

Legislation

Sounders and beacons are life safety products and therefore have to be reliable under all conditions that they are likely to experience. European fire alarm products fall under the Construction Products Directive (CPD) and therefore have to be third-part tested against the EN54 range of harmonised standards. The following standards apply to sounders and beacons:

- BS EN 54-3:2001, Fire detection and fire alarm systems. Fire alarm devices. Sounders. (Voice sounders are covered in Annex C)
- BS EN 54-23:2010, Fire detection and fire alarm systems. Fire alarm devices. Visual alarm devices

Where products are integrated into a single unit they have to be tested to all applicable EN54 standards.

Others Devices

Audible and visual alarms form the basis of the vast majority of alarm systems; however, there are occasions where they may be supplemented by other devices particularly where the disabled are concerned.

Radio pagers with a vibrate facility, induction loops that communicate with hearing aids and pillow vibrators are all used as additional techniques for fire alarm systems, they are however considered as secondary systems to the main audible and visual alarms, as they do require the user to ensure that they are applied correctly and are serviceable.

There are too many alarm technologies being investigated and developed to be covered in an article like this, but they all have to rely on stimulating at least one of our human senses. In essence, no one type of alarm will provide the total solution to all the needs of any particular installation, but that an amalgam of several techniques will be required to cover all needs. IFP

Bob Choppen is Product Manager at Cooper Fulleon

For further information, go to www.fulleon.co.uk

Pic courtesy DirectNIC.com

Graham Collins

The Industrial Building Fire Challenge

The consequences of a major industrial fire can be catastrophic, potentially impacting on the business' ability to survive, workforce safety and employment, the local environment and the surrounding community.

Industrial premises come in a wide variety of shapes and sizes and cover everything from the smallest traditional engineering workshop to the latest cutting-edge, hi-tech production facility. They can range from a relatively low fire load, low risk one-man operation to the massive high-hazard chemical and petrochemical complex. Some have a fast turnaround of goods with little inventory, while others demand the storage of highly flammable fuel, raw materials and finished goods. Not all operate within the conventional nine-to-five timeframe; some are in action around the clock whereas others have automatic machinery that is in unmanned "lights out" operation. Even the fire load can vary in some industrial premises, particularly those involved in manufacturing and storing seasonal goods.

If that is not enough to contend with, while industrial buildings around the world have been constructed to comply with a variety of building codes and standards, older buildings that were constructed long before today's regulations and codes of practice are still commonplace in many countries. The result is that industrial buildings can still be found that are built to less stringent standards than those in force today, with a degree of fire protection, compartmentation, fire stopping, fire detection and fire suppression that would be unacceptable in industrial premises built today. They frequently also utilise materials that are no longer acceptable. This includes asbestos and cladding and lining materials with unacceptable spread of flame or other fire performance characteristics.

The problems associated with these older industrial buildings are compounded by three other factors. Many are now used for purposes other than those originally intended, and possibly without approval for their change of use; they may well contain substantially different fire loadings and risks than were originally anticipated; and may now have environmental or neighbouring challenges that did not exist when the premises were originally built.

New methods, new challenges

Manufacturing, assembling and warehousing are today highly automated operations where the philosophy is often to achieve the maximum stock-holding in the minimum space; to make every

square metre of space earn its keep. High-level – sometimes floor the ceiling – racking and access gangways so narrow that fork-lift trucks and side loaders completely block the gangway are the norm.

Companies involved in the manufacture or distribution of seasonal or fast-turnaround stock run the risk of using every conceivable space for storage without sufficiently considering the implications for the safe evacuation of employees in a fire, or the safety of the emergency services tackling a blaze as a result of blocked access or evacuation routes. Storage can also be allowed to spill over into adjoining areas during periods of peak demand, utilising forecourts, yards and loading bays.

But, it is not just the increased density of goods that needs to be assessed. Attention also needs to be paid to the fire load characteristics of the stored goods. For example, highly flammable plastic shrink wrapping is now in widespread use, as is highly combustible cardboard and plastic packaging materials and plastic pallets.

These raise the question of fire risk assessments for industrial premises. While the need for them should by now be widely understood, the importance of treating them as an on-going activity may not be sufficiently appreciated by industry. Fire strategies for industrial premises need to be particularly robust and reliable, and the reality of the situation is that in industrial buildings where the volume of stock and its location change on a daily basis, a fire risk assessment needs to be undertaken at a matching frequency.

Very careful thought has to be given to fire safety precautions before shutting down existing fire detection and firefighting installations or cancelling maintenance regimes.

Empty building risk

The building owners' responsibilities are not removed by virtue of the building being unused or unoccupied. Even if the building is properly decommissioned and mothballed; the owner or occupier still has responsibility for the maintenance of fire detection and alarm systems or fire suppression installations in as far as they safeguard maintenance or security personnel, or impact on the safety of firefighters who may be called upon to tackle a blaze in the empty building.

Very careful thought has to be given to fire safety precautions before shutting down existing fire detection and firefighting installations or cancelling maintenance regimes. Empty premises are also particularly prone to vandalism and arson, so effective security needs to be implemented to make sure that essential fire safety equipment has not been maliciously damaged or even stolen.

Neighbourhood assessment

Particularly in older premises, a fire can easily spread to adjoining premises, due to the poorer fire performance of the materials used for its construction or the closeness of neighbouring buildings. So, there is a strong argument for co-operating with the management of nearby industrial units to exchange information on fire safety precautions, potential fire risks, preventative measures and fire risk assessments. Adopting an integrated and co-ordinated approach with neighbouring sites, and sharing that information with the local emergency services may well pay huge dividends in the event of a fire.

Special risks

Whomever is responsible for undertaking the fire risk assessment, it is imperative that he or she has an intimate understanding of the special risks associated with industrial buildings in general and of the specific material, production and process risks and challenges of the particular site. These risk assessments must be carried out and regularly updated by competent specialists who can demonstrate experience in these often volatile and special high-hazard environments.

Risk assessments for any high-risk industrial site – particularly if it uses toxic, highly flammable or explosive substances – should not be limited to what might be described as "internal" fire safety threats and challenges. For instance, the responsible assessor needs to take into account what is going on beyond the site's perimeter fence that might pose a fire risk: what spill-over risks do neighbouring properties and their processes pose, and how can these be negated.

Specific solutions

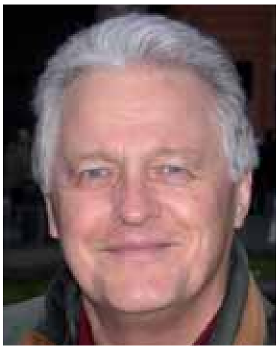
The type and complexity of the fire detection and alarm system and the provision of fixed fire suppression equipment will naturally vary from site to site, depending on many factors. Certainly, there is no shortage of reliable solutions on the market that adhere to the latest standards and codes of practice.

However when considering larger, more business critical or high risk industrial sites it is wise not to fall into the trap of believing that detection, alarm and suppression are all that need to concern the building owner. Frequently there is much more that needs to be considered. After all, the objective is to minimise the impact of a fire, and that may well mean not assuming that your responsibilities end with the arrival of the emergency services. The resources that are essential for the fire and rescue service need to be available at a moment's notice. One example is fire hydrants. Not only do they need to be in the right places, the pressure at each hydrant needs to be tested regularly.

Testing is essential

Testing of fire preparedness in industrial premises is not merely a matter of routine maintenance of the detection and alarm system or the fire suppression equipment; it should embrace every aspect of the emergency and evacuation arrangements in as close to a real-life or worse-case scenario as possible. The reality of the situation is that, while you may only ever have one fire, it may turn out to be the organisation's last. The statistics on business closures following a fire make sobering reading, and the life and property stakes are too high in these high risk environments to leave anything to chance. IFP

Take the Train



Graham Collins

Safety is a major concern for rail operators around the world, as the implications of a major fire at a railway station, in a tunnel, or on a rapid transit system have the potential for major loss of life.

According to the International Union of Railways, in 2009 there were 2,671 billion passengers per kilometre of track – and that excludes the growing number of metros around the world. Japan topped the league table with 22 billion passenger journeys in 2010, followed by India with eight billion. Germany came in just short of two billion, while the UK notched up 1.3 billion. Other countries that exceeded 500 million passenger journeys a year include China, France, Russia, South Korea, Italy, Spain and South Africa. So there can be no disputing that the challenge of achieving rail infrastructure safety is truly international.

End of the Line

To protect the safety and security of passengers and staff at the new Stobart Group's London Southend Airport, an entire portfolio of technologies from Bosch Security Systems is being installed.

The station and airport features the Bosch range of projection speakers and metal cabinet speakers to ensure effective communications with passengers, whose numbers are expected to rise to more than two million by 2020. The site is also equipped with a surveillance system that includes the first installation of its new digital hybrid recorder (DHR).

The railway station has been expanded as a direct result of plans to upgrade London Southend to handle larger aircraft, and therefore more passengers, requiring the highest specification CCTV. At the heart of the CCTV system are 20 Dinion XF colour cameras, 15 Dinion 2xday/night cameras, three video interconnect portals and three LCD TFT monitors. It is also the first site in the UK to use the new DHR technology.

In terms of delivering the messages and audio throughout the station, the decision was taken to opt for the scalable Plena Controller, which forms part of the PLENA communication family, including a remote control panel and zonal microphones. The railway station is also covered by Bosch speakers, with projection speakers located on the platforms and cabinet speakers within the waiting areas.

The Bosch 700 Series (formerly Divar XF) is a highly scalable system recorder for medium to large applications. It is a real-time 4-CIF embedded recorder, available in hybrid (analogue/IP) and IP-only versions and utilises state-of-the-art H.264 compression to deliver bit rates that are up to 30 percent lower than conventional MPEG-4 based recorders.

Crossrail Challenges

A number of new underground stations and upgrades to existing stations across London have been designed to accommodate the new Crossrail train network, due for launch in 2018.

Crossrail is promoted as the new high-frequency, convenient and accessible railway for London and southeast England. When the network opens – the first trains are due to start running in 2018 – it

will increase London's rail-based transport network capacity by ten percent. The network will run 118 kilometres from Maidenhead and Heathrow in the west, through new twin-bore 21 kilometres tunnels under central London, to Shenfield and Abbey Wood in the east. Linking Heathrow Airport, the West End, the City of London and Canary Wharf, it will bring an additional 1.5 million people within 45 minutes' commuting distance of London's key business districts.

It will reduce crowding on the transport network, carrying more than 1,500 passengers in each train during peak periods, as well as cutting journey times across the city. The project will also deliver substantial economic benefits and support regeneration, with the latest forecasts suggesting it will add £42bn to the UK economy.

Preliminary works began in 2009 but such is the scale of Crossrail that up to 14,000 people will be employed at the peak of construction between 2013 and 2015. A critical part of the project is the development of new and existing stations along the Crossrail route; one such station is Whitechapel Station in east London – due for completion in 2018.

Integrated Station

Exova Warringtonfire was part of the team appointed by Crossrail to carry out the redesign of Whitechapel Station. One of the major challenges was how to deal with the fact that the design turned existing surface platforms into underground platforms, which required a range of improvements to fire safety standards.

The work involved an extensive redesign of the station to integrate the new Crossrail platforms within the existing station served by both the London Underground and over-ground networks. The 200-metre long Crossrail platforms will be in deep tunnels to the north of the existing station, but there will be a shared concourse, ticket hall, gateline and station operations room – leading to a fully integrated station that provides an easy step-free interchange between Crossrail and the existing underground lines and over-ground lines.

Design and Layout

The design adopted was based on providing a new ticket hall and concourse directly over the existing over-ground platforms, bringing an improved passenger experience, as well as significant cost savings. They will replace the existing single-storey concourse and passenger bridge with a much larger and more open space above the London Underground lines, and provide room for a longer ticket gateline and a second wide-aisle gate. The existing stairs down to the London Underground platforms will be replaced with escalators and there will be lifts between each change in level, making the station much more accessible for all.

Passenger Safety

Experts worked with the design team to provide ventilation routes around the perimeter of the concourse, which provided smoke ventilation to the platforms below. In particular, a computational fluid dynamics (CFD) analysis of smoke flow was carried out for the new design, which considered several fire scenarios varying in size and location. The analysis demonstrated that the new design achieved a high standard of smoke ventilation, enabling work to proceed.

Another essential aspect of the design was the provision of escape routes from the new Crossrail platforms and the existing underground and over-ground platforms. With six platforms and passenger flow data for morning and evening, as well as several fire scenarios within different parts of the station to consider, a total of 16 evacuation scenarios were analysed.

The analysis was reviewed in collaboration with transport consultants to ensure there is sufficient evacuation capacity, while also minimising congestion in the expanded station. This led to a clearer, more logical layout favouring the use of familiar access routes for escape, rather than dedicated escape stairs. This improved safety, since research shows that people are more likely to use routes with which they are familiar, as well as reducing costs for the project by minimising the use of separate evacuation staircases.

Construction Strategy

Whitechapel Station needs to be kept open throughout the entire construction, which meant that a separate construction fire strategy had to be developed that reviewed all aspects of fire safety for each and every stage of the construction process. This included evacuation analyses and reviews of the smoke ventilation at each construction stage.

One issue that had to be dealt with early in the

design related to enabling works. A working platform consisting of a concrete deck needed to be built over the over-ground tracks and platforms to provide vehicle access to the site compound. As these platforms and tracks are currently open to fresh air, a CFD smoke flow analysis was carried out to review the impact of the deck and to gain the approval of stakeholders.

Tunnel Safety

The Docklands Light Railway (DLR) is one of Britain's great transport success stories. Built in 1987, it now carries over 60 million passengers a year and consistently achieves record levels of reliability and passenger satisfaction. It was one of Britain's first light rail systems and has one of the world's most advanced automatic train control systems.

Among the latest developments to the network is the £180 million, 2.5km extension of the line from King George V station on the north side of the River Thames to the new Woolwich Arsenal station on the south – an interchange with the main line railways. The tunnel under the River Thames runs as deep as 35 metres.

Ensuring the integrity of the emergency lighting in the tunnel was a major safety consideration for Docklands Light Railway, which is part of Transport for London. To achieve this, it selected Draka's Firetuf FT Connecta modular cabling system. Designed specifically for tunnel lighting and power applications, it provided the desired fire-condition performance, plus the additional benefits of speed and ease of installation and cost effectiveness. The contract called for 8,940 metres of its third-party-approved, Halogen-free 0HLS FTP fire performance power cable that is designed for installations where vital fire safety circuits are required to continue operating in the event of a fire. This was supplied in precise predetermined lengths and incorporated 711 factory-fitted moulded Connecta socket outlets.

During installation in the tunnel, secondary outlets to individual luminaires were taken from the primary FTP cables via moulded Connecta plugs. This ensured the fastest possible cable installation and minimised the site labour requirement. Connecta installations require minimal maintenance, so selecting this solution made a significant contribution towards reducing Docklands Light Railway's future maintenance and servicing costs.

The five-core FTP cable is manufactured to BS 7846:2000 (Electric cables. 600/1000 V armoured fire-resistant cables having thermosetting insulation and low emission of smoke and corrosive gases when affected by fire), and is tested and approved by LPCB (Loss Prevention Certification Board) and BASEC (British Approvals Service for Cables). It complies with BS 6387:1994 (Specification for performance requirements for cables required to maintain circuit integrity under fire conditions) and is accredited to maintain circuit integrity under category C, W and Z fire conditions.

Being Halogen-free, it is a natural choice for railway tunnels because it burns without producing large amounts of dense smoke and does not emit halogen gases. This compares with standard PVC cables, which are used widely in the construction industry, that under fire conditions emit hydrogen chloride gas. This has a suffocating odour that is detectable in even very low concentrations. Burning PVC cables also generate hazardous volumes of debilitating or disorientating smoke that can easily increase the likelihood of panic and make safe evacuation much more difficult to achieve. IFP

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Lee Coates

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There are some 195,000 deaths each year from fire; most, of course, are domestic fires. However, the human cost can be much greater when fire breaks out in a commercial building – particularly in countries that either have inadequate fire safety regulations or the means to stringently enforce them.

The fire regulations on which building safety depend are themselves based on an understanding of fire dynamics – the fundamental relationship between fuel, oxygen and heat – the so-called fire triangle on which all fires, intentional or otherwise, depend. Get those three elements together and the fire triangle is joined by a fourth element – the chemical chain reaction that is actually the fire. In technical jargon, the triangle of combustion then becomes a tetrahedron.

It is a geometry that can either be friend or foe, as fuel and oxygen molecules gain energy and become active. This molecular energy is then transferred to other fuel and oxygen molecules to create and sustain the chain reaction. In an uncontrolled fire in a building, how it spreads of course depends on a whole range of factors – from the type of fuel (everything from ceiling tiles to furniture) to the building construction and ventilation.

Taming fire generally involves the removal of heat, in many cases using water or foam to soak up heat generated by the fire. Without energy in the form of heat, the fire cannot heat unburned fuel to ignition temperature and the fire will eventually go out. In addition, water and foam acts to smother the flames and suffocate the fire.

But what is really needed is containment – to prevent the fire spreading from its original location. Those protective barriers, often external curtain walling or internal glass screens, must also provide escape routes for the building's occupants. That is where fire resistant glass and glazing systems are so important, because modern steel systems are so technically advanced that they have overcome the limitations inherent in the glass itself.

The biggest limitation is that glass softens over a range of 500°C to 1500°C. To put that in perspective, a candle flame burns at between 800°C and 1200°C. In a typical flashover fire inside a building, temperatures can reach between 1000°C and 1400°C.

These temperatures can disrupt the integrity of conventional panes of glass, which can crack and break because of thermal shock and temperature differentials across the exposed face. This will compromise the compartmentation of the building's interior allowing fire to spread from room to room. That can, incidentally, be a problem that a sprinkler system actually causes. There have been several notable cases where cold water from a sprinkler system has come into contact with

e Safety

heated non-fire rated glass – causing the glass to break and allowing more oxygen to the seat of the fire.

As a fire escalates, the amount of heat produced can grow quickly, spreading like a predator from one fuel source to another – devouring materials that, in turn, will produce gases that are both highly toxic and flammable. To make things worse, due to thermal expansion, these flammable gases are usually under pressure and able to pass through relatively small holes and gaps in ducts and walls, spreading the fire to other parts of the building. Heat will also be transmitted by conduction through internal walls.

As the fire worsens, and when unburned flammable gases reach auto-ignition temperature, or are provided with an additional source of oxygen – for example, from a fractured window – an explosive effect called 'flashover' takes place. Flashover is the most feared phenomenon of any firefighter and signals several major changes in the fire and the response to it. First, it brings to an end all attempts at search and rescue in the area of the flashover. Simply, there will not be anybody alive to rescue. Second, it signals that the fire has reached the end of its growth stage and that it is now fully developed as an inferno. That then signals a change in firefighting response because it marks the start of a worse danger – the risk of structural collapse.

However, most fires start with only a minimum of real danger – a dropped cigarette, a spark from a faulty wire – and, if dealt with quickly or adequately contained, pose no real threat. However, an unchecked fire can spread with devastating speed, particularly in a large open space such as a supermarket, open-plan office or factory. And when it does get out of control, the best means of survival is escape.

Around the world, more stringent building and fire regulations have led to architectural and design teams taking a multi-disciplinary approach to assessing hazards – from power failure to cyber-attack, from civil disorder to fire and explosive detonation – and arriving at risk assessments that, hopefully, illuminate how that that building should be designed and built.

Designing in safety is nothing new, and starts with actively assessing the possible risks against that building's occupants, structure, resources and continuity of operations. There are a number of assessment methodologies to understand the potential threats, identify the assets to be protected, and how best to mitigate against those risks. That assessment then guides the design team in determining acceptable risks and the cost-effectiveness of the measures proposed.

To prevent the fire spreading from its original location, what is really needed is containment. Protective barriers, often external curtain walling or internal glass screens, must provide escape routes for the building's occupants.

Assessing risk is the starting point, and in particular the need to build in compartmentation throughout the building, examining the whole building's capacity to withstand a fire or other threats. For the glazed components, that should mean analysing the level of containment the

glass will provide and its compatibility with its framing systems, because the safety of the glass cannot be assessed without its framing system. Put the right glass into the wrong frame, and you could be turning sixty minutes of fire-resistance into five minutes. In an evacuation situation where seconds count, getting the design wrong at the outset could be a costly – and deadly – mistake.

There are many types of fire-resistant glass currently on the market – and the ranges of products and sizes will continue to increase as the technology for combining glass and glazing systems develops. We have come a long way to meet the evolving design requirements of architects and the increasing stringency of building and fire regulations. Simply, the glass and framing technologies now on the market mean that the impossible is now possible.

A Case in Point – Fire Safety and the House of Pain

They call it the House of Pain, and the fire-fighters of Engine Company 10 and Truck Company 13 experience quite a lot of it. Theirs is the busiest fire station in the United States, serving a large residential area of northeast Washington DC. In April and May this year, they were called out 1,587 times.

Early on May 30th 1999, the District of Columbia Fire and Emergency Medical Services Communications Centre received a 911 telephone call reporting a fire at an address in Cherry Road. The first units were on the scene within minutes, and windows on the first and second floors were opened to provide ventilation.

Another fire team positioned alongside sliding glass doors at the basement level reported that the basement was full of smoke. Despite confusion over the location of the firefighters upstairs, a decision was taken to break out the basement's sliding glass, after which firefighters entered the basement to conduct a search.

They reported that there were a number of small fires on the floor of the basement. However, these rapidly increased in size after the sliding glass door was opened. The firefighters were ordered out of the basement as the fire quickly intensified, successfully escaping just before it became engulfed in a fully-fledged inferno. Seconds later, from upstairs, came the first report of a firefighter down. Firefighter Anthony Phillips was pronounced dead on arrival at hospital; another firefighter, Louis Mathews, died the following day as a result of his injuries.

It was the very routine nature of the fire and its tragic outcome that prompted the District of Columbia Fire and Emergency Medical Services Department Reconstruction Committee to request a full investigation into the fire dynamics of the incident. This was carried out by the Building and Fire Research Laboratory (BFRL) at the National Institute of Standards and Technology (NIST).

The investigation made use of NIST's Fire Dynamics Simulator (FDS), a computer modelling programme that looked at all available data. Specifically, the investigators wanted to know how the opening of windows and doors had affected the dynamics of the fire. The investigating team then identified the fuel package that was involved in the fire, and NIST's simulator identified the heat release rates of different types of furniture and furnishings, expressed as British Thermal Units (BTUs) or Kilowatts (kW) per second.

The model divides the space involved in the fire into thousands of "cells." In the Cherry Road simulations, the cells measured just 200 millimetres by 100 millimetres high. Once the physical data was entered into the computer, it was able to model the conditions for each cell, and then combine all of them together to provide an overall simulation of the fire. Investigators determined that the fire started near an electrical fixture in the ceiling of the basement, developing quickly but then depleting the supply of oxygen necessary for combustion.

It was at this point, when the fire's heat release rate was being constrained, that firefighters made their entry on the first floor of the building. However, and against some expectations, opening windows on the front of the townhouse on the first and second floors seemed to have had no noticeable impact on the fire's development. It was the breaking open of the basement door that created the firestorm. The FDS calculations were that the opening of the basement sliding glass doors provided outside air into a pre-heated but under ventilated fire compartment, which then developed into a post-flashover fire within 60 seconds.

Some of the resulting fire gases flowed up the basement stairwell with a high velocity and collected in a pre-heated, oxygen depleted first floor living room with limited ventilation. More precisely, the model showed that the superheated gases moved up the stairs at approximately 18 miles an hour. As the townhouse was only ten metres high, it meant that the extremely hot gases moved through the building in less than two seconds.

This is at the heart of compartmentation; to provide effective barriers against the passage of fire, heat and toxic gas and, by preventing oxygen from reaching the seat of the fire, inhibiting its progress. This allows people to escape and, by containing the fire, minimises fire damage.

As the Cherry Road fire showed, failure to contain fire can have very human consequences, even in a residential home. In larger multi-storey buildings, the stakes are very much higher, and the responsibility on the designer that much greater. IFP

Put the right glass into the wrong frame, and you could be turning sixty minutes of fire-resistance into five minutes. In an evacuation situation where seconds count, getting the design wrong at the outset could be a costly – and deadly – mistake.

Lee Coates leads research, development and worldwide testing at Wrightstyle Limited

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DX1040	Anionic	●	●	–	–
DX1080	Nonionic	●	●	●	●
DX1090	Nonionic	●	●	●	●
DX1025*	Anionic	●	●	–	–
DX1026*	Anionic	●	●	●	●
Foam Stabilizers					
DX5022	Anionic	–	●	–	●
DX5065**	Anionic	–	●	–	–
DX5066**	Anionic	–	●	–	●

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Scott Starr

Firetrace International

Mine Fire Safety

Fire represents one of the greatest threats to those working either above or below ground in a mine environment. It takes little for a minor outbreak to escalate in minutes into a disastrous conflagration, so stopping a fire in its tracks has to be the top priority.

The United States Department of Labour's Mine Safety and Health Administration points out that safety and health in the mining industry has made significant strides during the 20th century, and over the last 25 years in particular. However, mining remains an inherently high risk environment where the impact of a fire can have catastrophic consequences. Challenges abound above and below ground.

According to the National Institute for Occupational Safety and Health (NIOSH) electrical shorts and equipment malfunctions are among the leading causes of US mine fires. From 1990 to 2007, there were 1601 reportable fires that occurred in the US mining industry – an average of 89 fires a year. So, the fact that mine fires are occurring with alarming regularity reinforces the importance of recognising and eliminating the potential hazards.

While over the years the main working areas below ground have undergone any number of health and safety improvements, the same cannot always be claimed for some of the equipment used in mines that has the very real potential to catch fire, triggering a major blaze.

Much of this equipment is housed in cabinets or enclosures – often referred to as "micro-environments" – and includes cabinets housing essential electrical control equipment, many of which may well be essential to miners' life preservation. However, mines typically have a host of other "micro-environment" fire safety challenges. These range from emergency lighting installations to essential-power cabling installations, generators, batteries and UPS equipment, conveyors, lifts, control rooms, sub-stations and fuel stores.

Hardly surprising then that NIOSH's Office of Mine Safety and Health Research Fire Fighting and Prevention concludes that: "fire detection is a critical component in the safety of underground mines."

The Blind Faith Trap

Blind faith – a belief without true understanding, perception, or discrimination – should have no

place to thrive when it comes to mine safety. Unfortunately, it is an easy state of mind to slip into, particularly in an environment where safety in general is seen as a top-of-the-agenda priority.

It is easy to believe, for example, that once installed, a fire suppression system can be endlessly relied upon to work without any means of assessing its readiness on a daily basis. Worse, emergency response training, important and commendable though it is, can foster a mistaken belief that a seemingly small fire in a cabinet, enclosure or compartment would soon be spotted, contained and dealt with. Sadly, history is littered with instances where the consequences of this mistaken belief have been measured in lives lost and assets destroyed.

The reality is that many infernos start as a small fire that, left unattended – often for an alarmingly short space of time –will develop into a major conflagration.

Above ground, the main fire safety challenge is to be found in among the heavy plant and machinery engine compartments and breaking systems, and so are where investment in fire safety measures are most likely to have the greatest impact and payback. According to the findings of the United States Department of Homeland Security's National Fire Incident Reporting System and the country's National Fire Protection Association, mechanical and electrical failures or malfunctions account for the majority of fires in off-highway equipment, with

one of the most common locations for the outbreak of a fire being in or around the engine compartment.

The only truly effective solution is to provide each of these "micro-environments" – above and below ground – with dedicated, intrinsically-safe, risk-specific fire detection and suppression. This calls for the use of tried-and-tested technology that is completely self-contained, requires no external power source, is not affected by atmospheric contamination, and can withstand the punishing working environment.

The Underground Fire Threat

Çayeli is an underground copper and zinc mine located in Rize on the Black Sea coast of north-eastern Turkey, employing over 450 with a further 159 contractors on site. It is one of the largest copper reserves in Turkey and mills 3,000 tonnes of ore a day.

The main "enclosed" fire risks were identified by the mine's management as being the underground mud pumps and electrical cabinets and, to ensure that adequate fire protection was provided, the company drew up a checklist of essential features. This included:

- The need to provide 100 percent response reliability.
- The ability to stop a fire precisely where it breaks out, before it has any opportunity to take hold and spread.
- Being unaffected by vibration or the heavily

dust-laden underground environment, debris and airflow.

- Provide around-the-clock, unsupervised protection.
- Not require external electrical or other power that has the potential to fail and so put the system out of operation.
- Being intrinsically safe to match the high standards of safety required in the mining industry.

Following detailed consideration of several potential solutions, it became apparent that a number of other features had to be added to the original list of requirements. These included the advisability of the solution being a fully integrated fire detection and fire suppression package; one that used a fire suppressant agent appropriate to the particular fire hazard and the equipment being protected. To ensure continued operation of the mine following a fire, the importance was recognised of choosing a solution that utilised a suppression agent that, when discharged, would not damage the equipment it is there to protect. Avoidance of time-consuming clean-up operations was also seen as critically important to getting the mine back into operation following a fire.

The solution chosen for both mines can only ever be activated by a real fire, overcoming any prospect of false alarms or unnecessary agent discharge that might otherwise curtail mining operations.

The Mine Vehicle Fire Risk

The management of the Assarel-Medet JSC mine in Bulgaria reached similar conclusions when seeking to protect its heavy ore-moving crawler equipment. However, to this list of essential features, the company added that the solution must be able to contend with the wide temperature variations experienced in Bulgaria, where in winter it can drop as low as –5°C, while summer temperatures can be as high as 28°C. It was also deemed important that the solution should not jeopardise the operation or maintenance of the equipment it is protecting, or demand excessive space for suppressant storage, as space within the crawler's engine compartment is very limited.

Assarel-Medet JSC is the country's largest open-pit copper mining and processing company, producing around 200,000 tons of natural copper concentrate every year and processing in the region of 13 million tonnes of copper – more than half of the country's copper output. Located in the Sashtinska Sredna Gora Mountains, north-west from the town of Panagyurishte and 90 kilometres east of Bulgaria's, Sofia, its operations cover an area of 20,000 acres at an average altitude of 1000 metres.

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So, understandably, the loss or serious damage of one of these giant machines resulting from an engine fire would seriously jeopardise production schedules, possibly for many months while the crawler was repaired or even replaced at the cost hundreds of thousands of dollars. An uncontrolled engine fire also places the equipment operator at risk of serious of injury or death.

However, the precise nature of the fire hazard that these crawler vehicles present had to be carefully considered if the detection and suppression solution was to offer the maximum protection. In addition to the crawler's fuel and the risk of fuel line ruptures, this meant taking into account any number of flammable liquids present throughout the engine compartment. These include hydraulic, brake, automatic transmission and power steering fluids, along with combustible accumulated grease on the engine block, for which frayed or damaged electrical wiring can easily provide the ignition source.

The dynamics of the airflow in and around a crawler's engine compartment when it is in motion was another factor; it has the potential to seriously impair the performance and reliability of traditional detection and suppression systems. This is because heat and flame typically rise from the source of a fire and may, when the crawler is moving, be propelled elsewhere. The inevitable build-up of dirt in and around the engine, intense temperature variations and vibration are also factors that are known to cause traditional detection and suppression systems to fail to provide the necessary fast and accurate fire detection and suppression.

The Çayeli underground project uses both the Firetrace Direct System and the Firetrace Indirect System. In the Direct System, the Firetrace Detection Tubing performs a dual function; it is both the detection device and the suppressant delivery system, whereas the Indirect System uses the tubing as a detection and system activation device, but not for the agent discharge.

This inevitably led to several potential solutions being dismissed by Assarel-Medet, including those that either were solely detection or solely suppression, and not an integrated solution.

Integrated Detection and Suppression

In both cases, at the Çayeli mine in Turkey and the Assarel-Medet JSC mine in Bulgaria, the decision was taken to opt for a tube-based fire detection and suppression system and, after careful research, both selected US-based Firetrace International's Firetrace system that is today safeguarding 150,000 installations around the world.

Each of the Firetrace systems comprises an extinguishing agent cylinder that is attached to proprietary Firetrace Detection Tubing. This is purpose-developed leak-resistant tubing that at the Çayeli mine is snaked throughout the cabinets and mud pump enclosures, and that at the Assarel-Medet JSC mine is threaded throughout the crawlers' engine compartment.

Heat or flame will immediately cause this tube to rupture and the suppression agent is automatically released, extinguishing the fire precisely where it starts and before it can take hold. An important consideration for both mines' managements was that, unlike many of the other suppression systems evaluated, Firetrace can only ever be activated by a real fire, so there is no prospect of false alarms or unnecessary agent discharge that might otherwise curtail mining operations. Significantly, it is the only UL [Underwriters Laboratories] listed, FM [Factory

Mutual] approved and CE [Conformité Européene or European Conformity] marked tube-operated system in the world that is tested as an automatic fire detection and suppression system.

The Çayeli underground project uses both the Firetrace Direct System and the Firetrace Indirect System. In the Direct System, the Firetrace Detection Tubing performs a dual function; it is both the detection device and the suppressant delivery system, whereas the Indirect System uses the tubing as a detection and system activation device, but not for the agent discharge. The rupturing of the chemical-resistant tube results in a drop of pressure that causes the system's indirect valve to activate. This diverts flow from the detection tube, and the agent is discharged from the cylinder through diffuser nozzles, flooding the entire enclosure.

A pressure gauge on the cylinder allows quick and easy checks to be made to ensure that the system is always operational.

Suppressant Agent Selection

The choice of suppression agent was critical for both mines. Two risk-specific suppression agents were chosen for the Çayeli mine project – ABC dry chemical powder is safeguarding the mud pump enclosures, while 3M Novec1230 Fire Protection Fluid is being used to protect the mine's electrical cabinets. The Assarel-Medet crawlers, which utilise just the Firetrace Direct System, are also using ABC dry chemical powder.

ABC powder insulates Class A fires – those involving freely burning materials such as wood, paper, textiles and other carbonaceous materials – by melting at between 182°C and 205°C. The powder also breaks the chain reaction of Class B and Class C (Class B in the USA) fires – those involving flammable liquids such as petrol, diesel, solvents, lubricants and spirits, and flammable gases such as butane and propane – by coating the surface to which it is applied.

Another advantage of using ABC powder in these applications is that, on discharge, it leaves a residue that absorbs flammable liquids, helping to avoid re-ignition. The particles of powder are too large to penetrate engine air filters and so only the exposed external engine surfaces will need to be cleaned after a system discharge, by wiping, vacuuming, or washing.

3M Novec1230 Fire Protection Fluid is the latest clean-agent suppressant, one that quickly knocks down Class A, B and C fires with no risk of thermal shock damage to delicate electrical equipment. It is electrically non-conductive and non-corrosive and leaves no oily residue so clean-up operations are unnecessary following a suppressant discharge. It is stored as a low-vapour-pressure fluid that, when discharged, transmutes into a colourless and odourless gas, using a concentration of the fluid that is well below the agent's saturation or condensation level. IFP

Scott Starr is director of Marketing at Firetrace International

For further information, go to www.firetrace.com

Fire Safety in an Ag

Larry Cody

Rockwool UK

Rising energy prices and a desire to decarbonise economies are combining to make home energy efficiency a huge focus for developers, governments and consumers.

Upcoming gas and electricity price hikes are set to add £300 to the average UK household bill, with Government targets aiming for a 80% reduction in carbon emissions by 2050.

As a result, businesses and consumers are looking at new ways to boost home energy efficiency and the UK Government's landmark Green Deal is set to move this further up the agenda, with energy companies tasked with introducing energy efficiency measures, such as external wall insulation.

While the moves to boost energy efficiency is good news for the environment, it brings new challenges when it comes to protecting buildings from fire.

Traditionally buildings have been constructed using stone, brick and other non-combustible materials that provide high levels of structural strength. Today, in a bid to reduce building costs and boost energy efficiency, lighter-weight construction materials and systems, such as steel for the structural framework and glass or composite panels as the external cladding are being used, with thermal insulation incorporated into the products or added as separate layers to cut the carbon footprint.

However, the combustible nature of some of these materials can increase the fire load of the building fabric, which may require architects and fire engineers to take a new look at the way buildings are designed, constructed and maintained. Sustainability legislation, such as the Energy Performance Building Directive, intends to save energy resources by driving the requirement for increasing levels of insulation. However, this must not be allowed to compromise safety or increase fire risk.

The green agenda is now seeing a wider range of insulation materials being used in construction,ranging from animal wool and straw to numerous man-made products, and each has its own characteristics that should be considered when assessing potential fire risk.

It is essential to identify risks and ensure measures are taken to reduce these to an acceptable level. While the use of non-combustible insulation may provide some assurance around built-in fire safety, this does not exclude the use of combustible insulation. However, the fire engineer must differentiate between these products and assess their potential impact if a fire was to occur. This analysis should include their contribution to fire load and speed of fire growth, together with toxic gas and smoke emissions.

When choosing insulation, the prime consideration is usually thermal performance. Closed-cell polymer products, such as phenolic or polyurethane foams are generally used in construction when the thermal performance is required from a relatively thin layer of insulation. Mineral wool products, such as stone or glass wool, are generally where a combination of thermal and acoustic insulation is needed, as their fibrous structures are very effective in breaking

e of Sustainability

down and absorbing sound waves. Where weight is an issue, expanded polystyrene boards or lightweight glass wool quilts are often specified, while high compressive strength foam glass can be beneficial to avoid damage from point loading.

Many insulation products can claim to be sustainable, as their primary purpose is to reduce energy consumption. While the common perception is that insulation products based on quickly and naturally regenerating materials have the greenest credentials, some rely on added fire retardants to delay fire ignition.

This is one of the preferred methods of protecting combustible products from fire, and retardants work in a variety of ways. Most are intended to delay the onset of ignition typically by reducing the total heat output and fire growth through chemical actions such as dilution (water formation) and mechanical actions such as surface charring. While fire retardant technology has improved considerably, designers do need to ensure the fire retardant will not increase the toxic emissions of the product during a potential fire, which may reduce the time available for safe escape.

The table below provides typical density, thermal conductivity and the likely reaction-to-fire performance of insulation materials commonly used in the construction industry. It can be seen that the most thermally efficient products would not be expected to comply with the non-combustible classification, as defined in UK Building Regulations.

Insulation and Fire Issues in Construction

With insulation playing an increasingly important role in modern construction, there have been concerns about the impact this can have on fire performance. The following four methods of construction are of significant interest and raise questions which should be addressed when assessing and reducing risk.

- **Timber Framed Buildings**

A number of high profile fires involving timber framed buildings have occurred during construction. In their finished state, timber framed buildings are protected through the use of 'built-in' passive fire protection, such as non-combustible insulation, plasterboard linings, cavity fire stops and active systems such as sprinklers.

Insulation materials commonly used in the construction industry	Density	Thermal conductivity (Lambda 90/90)	Reation-to-Fire	
	(kg/m^2)	(W/m.K)	EN 13501-1 class	UK REGS
Phenolic foam	30 – 40	0.021 – 0.024	B – C	Combustible
Polyurethane foam	30 – 80	0.022 – 0.028	D – E	Combustible
Polyisocyanurate foam	30 – 80	0.022 – 0.028	C – D	Combustible
Extruded polystyrene foam	20 – 80	0.029 – 0.039	E – F	Combustible
Expanded polystyrene foam	10 – 50	0.031 – 0.038	E – F	Combustible
Multi-Foils	20 – 30	0.032 – 0.034 (polyester core)	E – F	Combustible
Cork	100 – 250	0.037 – 0.048	E	Combustible
Cellulosic fibre	20 – 65	0.035 – 0.040	E	Combustible
Sheep's wool	23 – 30	0.038 – 0.040	E	Combustible
Reed thatch	240 – 270	0.070 – 0.090	E	Combustible
Glass Mineral Wool	10 – 100	0.031 – 0.044	A1 – A2	Non-combustible
Rock Mineral Wool	22 – 180	0.034 – 0.042	A1 – A2	Non-combustible
Foamed glass	100 – 120	0.040 – 0.050	A1 – A2	Non-combustible

Right: *Homes across the globe will receive a thorough thermal upgrade with external wall insulation. It is essential this upgrade does not increase the fire load of the building*

However, we need to look further than the timber frame for an explanation as to why some of these buildings have been destroyed so quickly in fires. Softwood timber has a well recognised charring rate of approximately 0.7mm a minute when exposed to a fully developed fire and highly insulated walls and roofs have been in existence for many years in Scandinavian countries, so what else should the fire engineer consider when assessing such constructions?

The green agenda is now seeing a wider range of insulation materials being used in construction,ranging from animal wool and straw to numerous man-made products, and each has its own characteristics that should be considered when assessing potential fire risk.

Traditionally, the insulation used in Scandinavian constructions over the last sixty years has been non-combustible mineral fibre. When packed between the timbers, this type of product can offer significant protection by shielding the side faces of the wood frame from the full force of the fire. This can also be effective when the internal or external linings have yet to be installed or if these linings have been compromised during the early period of a fire.

While it may be possible to reduce the depth of studwork if polymer foam insulations materials are used, it is unlikely these will offer the same protection levels to the studwork and if the fire is sufficient to ignite the foam, will the additional heat generated locally to the timber faces lead to an increase in charring rate? If so, could this affect the load-bearing capabilities of the timber frame leading to a premature structural collapse?

- **Structural Insulated Panel Systems (SIPS)**

SIPS consist of a sandwich formed by bonding two outer skins, normally OSB bonded, to an insulation core, such as PUR, PIR, EPS or XPS. They are used as load-bearing panels for both internal and external walls. Each of these components is combustible and panels can be highly susceptible to fire. As a result they rely heavily on fire resistant membranes, such as plasterboard, to fulfil load-bearing functions in a fire.

Between 2008 and 2010, Britain's Building Research Establishment (BRE) in conjunction with the UK Government carried out an investigation into how SIPS performed in fire. This work was based on fire resistance testing using the standard (cellulosic) heating curve and is detailed in BRE Information Paper IP 21/10. This report contains recommendations suggesting that Type F plasterboard thicknesses of 15mm and 30mm would be sufficient to maintain the insulation core below a critical temperature of 100°C for fire resistance periods of 30 and 60 minutes respectively.

It is important to note that the plasterboards should be fixed via 25mm thick battens to the OSB skins as the air space this creates is essential in keeping the insulation core below 100°C. When assessing fire resistance test data, insulation core temperatures should be an important consideration to the fire engineer when making judgements on the load-bearing capabilities of composite panels.

- **Metal Faced Insulated Sandwich Panels**

These products are formed as a sandwich with metallic faces, usually steel, aluminium or,

SUSTAINABILITY AND FIRE PERFORMANCE

Left: *A home with a completed non-combustible external wall insulation system*

occasionally, copper. The most common forms of insulation used for the core are polyisocyanurate, mineral fibre, phenolic or polystyrene. They can be used for external cladding, where they are normally fixed to a steel frame, as well as internal structures, sometimes free-standing.

As they are not often required to perform a load-bearing function, this removes one of the concerns associated with SIPS. Where a load-bearing capability is required, this is usually the function of the frame that can be independently fire protected using a fire resistant board/spray system or Intumescent paint.

Each type of panel system has its own unique fire behaviour. However there have been a number of instances in recent years where these products have been involved in fires. This has prompted the provision of specific guidance (such as Appendix F of The England & Wales Building Regulations and LPCB guide for the UK insurance industry) intended to assist the specifier in choosing the appropriate insulation core and panel system.

As long as the specifier and fire safety engineer follow guidance for identifying and minimising fire risk, these products can be used safely. In addition, the use of fire stop panels, or fire breaks within the combustible foam core could be considered as a method for reducing the risk of fire spread between panel facings.

- **External Thermal Insulation Composite Systems (ETICS)**

There have been a number of significant fires involving externally insulated rendered systems. This type of system is popular in the refurbishment market as it allows buildings to remain occupied during the installation. It is becoming increasingly evident that the combination of insulation products, type and thickness of render, fixing methods and any requirement for fire stopping around openings and/or at floor levels can have a critical influence of the speed and distance of flame spread.

The thickness of the insulation layer can also be key. Greater thicknesses can hold more heat on render surfaces, which may accentuate fire spread. It is imperative the specifier ensures the system has been tested at the intended thickness. The installer should also check that the tested system did not exhibit falling debris, which may impair escape routes or fire fighting access.

The most effective way of assessing flame spread associated with systems involving substantial surface areas, such as those where ETICs and sandwich panels are involved, is by using large scale fire tests involving a realistic fire source. This will provide information to evaluate the combined system of insulation, fixings, fire stops and the exposed surfaces such as the render or bonded steel facings.

When such large scale test evidence is unavailable, it becomes more important to obtain a clear understanding of how construction products and materials perform in a fire. If a manufacturer or system holder is basing fire performance claims on small scale testing, the specifier would be wise to ensure this is derived from appropriate, standardised tests. These should provide a clear indication of how the complete system could perform in a fire. Conversely, statements based on non-defined marketing terms should be treated with caution.

As architects and developers are increasingly required to cut the carbon footprint of buildings, insulating the structure becomes more important, but to do so safely requires a greater understanding of the fire load that insulation adds to the structure.

It is neither practical nor desirable to return to using only non-combustible construction products. The need for cabling and plastic components alone makes this virtually impossible. Instead, fire safety engineers need to work with designers and architects to educate and influence their choices and design out the risk through careful understanding of the properties of construction materials, notably insulation.

In doing so we can ensure the race to develop green buildings is not done at the cost of greater fire risk. IFP

Larry Cody is Senior Product and Services Development Consultant at Rockwool

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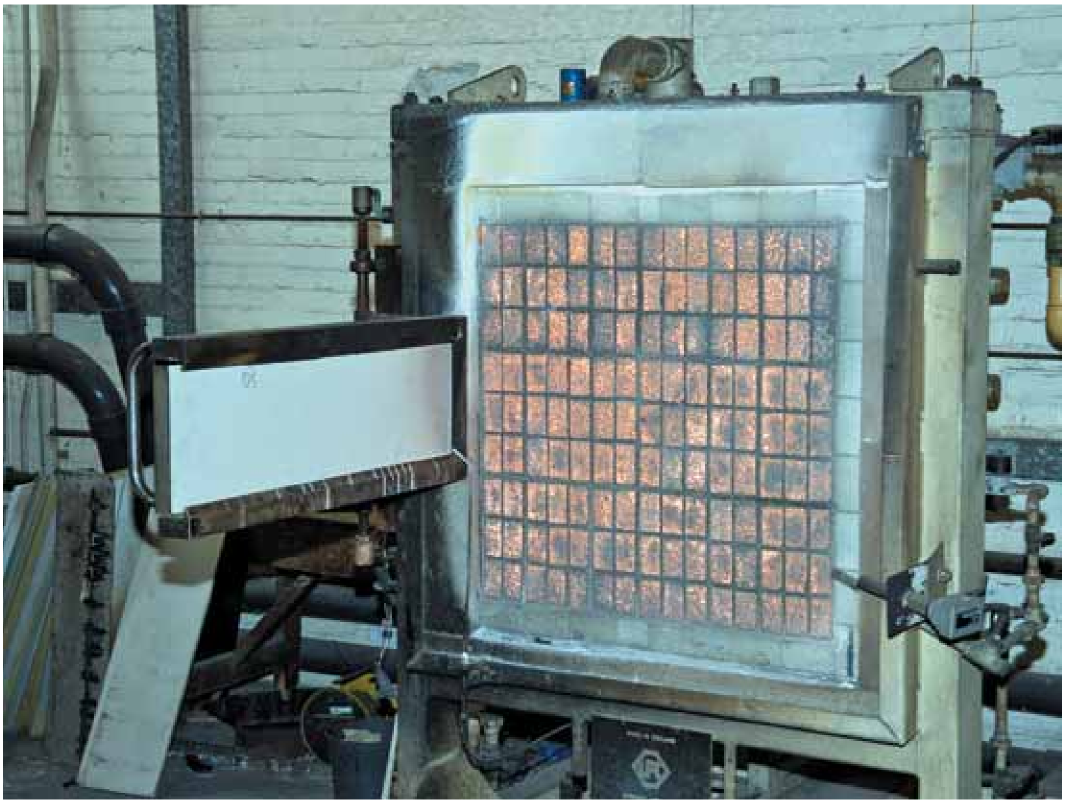

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Wilf Butcher

Association for Specialist Fire Protection

Two thousand years of fire safety regulation

– Have we got it right yet?

One tends to think of fire safety in relation to building regulations and codes as an evolutionary process that developed in structure and stature throughout the twentieth century. In fact, history tells a very different story in that building regulations, (perhaps proclamations may be a better definition) in relation to fire safety, go back many centuries.

Maybe the most draconian and arguably the most prescriptive building control measure ever imposed was introduced by King Herod (74BC-4AD) which stated that: 'Should a man construct a building which falls down and kills another then this man should be slain '.

A thousand years later, William the Conqueror was somewhat dismayed at the rate in which houses were burning down in his newly concurred kingdom of Britain, so he called for all house fires to be extinguished each night. The most popular method of so doing was to use a special metal plate called a 'Couvert Feu', which is the origin of the word we know today as 'Curfew'.

What both of these regulatory dictates had in common is the fact that they were both imposed by a rule of law and as in the case of King Herod's proclamation the price of failure to comply was pretty punitive. However by the late twentieth century, building regulations in many parts of the world had evolved away from the need to impose prescriptive measures, into a far more engineered approach to fire safety.

Such a change in approach, now common place today, places the onus of responsibility on all those in the design, build and maintenance process to take greater responsibility in ensuring that their element of the building process will meet with the building regulations of the day. All well and good you may say, but and there is a very big but! What if such measures are not adequate? Let us be clear, building regulations in relation to fire safety are all

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about the safe evacuation of a premises and the protection of the firefighting services that are called to extinguish a fire. They are not designed to ensure the survival of the structure of a building itself.

So when we talk about the appropriate fire resistance of a building what do we actually mean? Wikipedia, that well know font of much knowledge, defines fire resistance as follows: 'A fire-resistance rating typically means the duration for which a passive fire protection system can withstand a standard fire resistance test. This can be quantified simply as a measure of time, or it may entail a host of other criteria, involving other evidence of functionality or fitness for purpose.'

While this may be a few simple lines of explanation, the underlining context within this reference is none the less quite complex. Why? Because to ensure that appropriate fire resistance is achieved it is essential to appreciate a number of crucial issues, namely:

- The robustness of the building design.
- The appropriateness of the fire-resisting products and systems chosen.
- The certainty that such products and systems will be installed correctly.
- That the fire resistance of the building as a whole is maintained adequately throughout its entire working life.

Without all of the above, the fire performance of a building cannot demonstrate 'fitness for purpose' and in all likelihood will not comply with the appropriate building regulations. The fact that there is an onus of responsibility to comply with such regulations is undeniable; the issue therefore is one of achieving compliance.

Achieving Compliance

As a general definition, compliance means conforming to a rule, such as a specification, policy, regulation, standard or law. However, for many aspects of the building process, to simply rely on self-regulation to achieve this goal is unrealistic, as without any real checks and balances there can be no way of credibly determining that compliance has been achieved.

It should be appreciated that if you are involved in the provision of a fire protection package, at any stage in the process, you share liability for its usefulness and its operation when it is needed in fire, and that liability will still be there in the event of a court case.

If you have responsibility for the specification of the products or systems that go into ensuring the fire performance of the fabric of a building, or you hold responsibility to appoint the installation contractor, it is also your responsibility to ensure that they can prove competency for the fire protection process adopted. It is no longer simply a duty of care or voluntary – it is a legal obligation. If advice is knowingly ignored and this leads to a failure in the fire performance of any element of installed fire protection within a building, then you are likely to be found to be just as culpable as the deficient installer.

In the event of fire, and deaths, a court will want to know how every fire protection system was selected; the basis for selection of the installer, whether adequate time was provided for its installation, and whether there was adequate liaison between the different parties to ensure it was installed correctly.

Third-party Certification

One of the key steps in ensuring that the above criteria are met is to ensure that any compliance process incorporates the inclusion of third-party certificated products, which in turn are installed by third-party certificated installers. This ensures an auditable trail from the specialist that installed the relevant fire protection measure, back through to the product or systems manufacturer.

Such a process of certification includes:

- Selection of samples from the factory or market.
- Surveillance by testing, factory production control, on-going audit procedures and evaluation of quality management systems to ensure consistency of production.

- Labelling that identifies the certification body.
- Maintenance of a register of certificated product.
- Installations independently inspected.
- Accredited Certificates of Conformity issued by the installer

Third-party product certification is the only way of providing architects, specifiers, enforcement authorities and building owners with a high level of confidence that products are 'fit for purpose'.

Fire Tests

This audit trail is vital in another key area of specification that is to determine the relevance of the testing, inspection, design appraisal or assessment processes adopted. In other words, is the fire testing and certification as presented appropriate for the fire regime required?

When it comes to the issue of fire, how you interpret the validity of a fire test report or assessment certification could make the difference between whether the fire protection measure in question succeeds or fails in its objective. The process of fire testing is a vigorous and often a very costly endeavour, and common sense dictates that not all potential configurations to which a product or system is to be used can be realistically tested. In such circumstances, a range of tests may be carried out in different configurations, which in turn leads to an extrapolation of data to form an assessment report.

Even where passive fire protection measures are clearly visible it is not always possible, at a glance, to determine the extent of the installed fire protection, for example, how long the fire protection measure is designed to perform for in a fire.

Such test or assessment evidence of performance will have been undertaken through a nationally recognised testing laboratory, based upon a recognised appropriate standard. Such comprehensive reports should not be confused with 'indicative' or 'ad-hoc' tests. The Association for Specialist Fire Protection in the UK, along with many certification bodies are now very concerned at the growing indiscriminate use of such very limited test reports that may well appear to solve a difficult dilemma, but in reality give little more than the illusion of a solution that has no foundation in practice.

To be clear, there is nothing wrong with any manufacturer undertaking such a testing process as a way of observing and assessing how its products or systems may perform in conjunction with the type of configuration to which it may be used. However, the test laboratory will often state in its report that the information gained is for the test sponsors benefit only and, as such, should not be used to demonstrate performance against the standard to which it would normally be measured; nor should it be taken as a means to assess such a product or system against any regulatory requirement.

Should such test evidence be proposed then it is essential to consider the following:

- Ensure that you have been given the whole test report and not just the fire test data, as all of the conditions for the use of the fire test will be covered within the report's introduction.
- If the data given is based on a small scale test alone, ask to see other evidence of full scale testing in compliance with the appropriate test Standard.
- If you have any doubts as to the validity of the data given for the conditions under which it will be used, seek advice from the testing body that undertook the test, or request that the manufacturer in question obtains a confirmatory letter from the testing body to this effect.

Risk Assessment

Ensuring that the appropriate passive fire protection measures are encapsulated within the initial build process is of course only part of the story. Just as essential is the on-going fire safety regime of a building, for which the owner of the building, often defined as the 'Responsible Person' is required to ensure that appropriate fire risk assessments are undertaken to determine that there is a clear understanding of all the elements, both passive and active, that go to make up the installed fire protection measures, throughout the life of the building.

Risk Assessment for passive fire protection is often not a straightforward exercise as many of the measures involved (for example, fire stopping) may not be easily determined by an 'on the ground' visual inspection. Many will be hidden above suspended ceilings or within cavities and in some cases, may even be located inside other components not obviously recognised as fire protection, for example, a fire damper within an air ventilation ducting system.

Evidence is growing that would indicate that many risk assessments are undertaken based upon inspection that does not take account of the fire protection measures hidden from view. Such inspections therefore run the risk of omitting to identify whether any of the fire compartmentation measures installed have been breached and left unrepaired. To the untrained eye, a hole in the wall may just be seen as a maintenance issue. If it also happens to be a fire compartmentation wall, however, the issue is likely to be far more serious.

Even where passive fire protection measures are clearly visible it is not always possible, at a glance, to determine the extent of the installed fire protection, for example, how long the fire protection measure is designed to perform for in a fire.

It should be recognised that not all passive fire protection is installed by a specialist company, as by circumstance it often forms just a small part of another trade's activities in the continual maintenance of a building, for example, new plumbing or electrical installations.

Failure to correctly install or maintain passive fire protection products and systems may result in premature or total failure of a fire compartment wall in the event of a fire which, in turn, may lead to rapid spread of smoke, toxic gases and fire. IFP

Wilf Butcher is Chief Executive of the Association for Specialist Fire Protection

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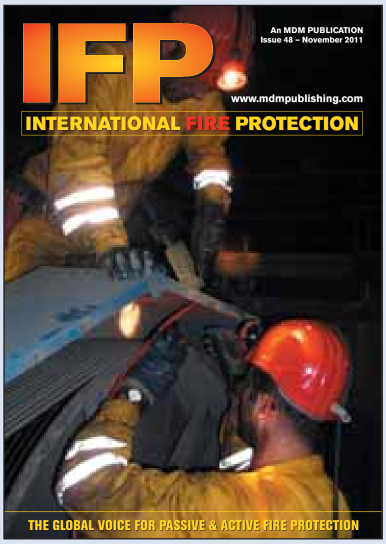

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